Long Beach Water Department
The Standard in Water Conservation & Environmental Stewardship

May 22, 2007

Mr. David Todd
Office of Water Use Efficiency
Department of Water Resources
901 P Street, Third Floor
Sacramento, CA

P.O. Box 942836
Sacramento, CA 94236-0001

Subject: Amended 2005 Urban Water Management Plan, Long Beach Water Department

Dear Mr. Todd:

Per my discussions with Mr. Sergio Fierro, of the southern district of the DWR, the City of Long Beach Board of Water Commissioners, after conducting a noticed public hearing, amended its 2005 Urban Water Management Plan. The amendments were two-fold: changing how imported water supplies are discussed on pages 18 and 19 in the body of the text, and changing how they are anticipated in Table 20 of Attachment B.

I have attached a hard copy of these documents, a copy of the notice of the public hearing, and a document showing the Board's action with respect to this matter. Please let me know if you require anything else in order to conclude this matter; you can contact me at the address show below, or reach me at 562/570-2315 or at "matt_lyons@lbwater.org".

Sincerely,

Matthew P. Lyons
Director of Planning and Conservation

cc: Sergio Fierro (received electronic copies of attachments)
DWR, Southern District
770 Fairmont Avenue, Suit 102
Glendale, CA 91203

Att.

The Long Beach
Press-Telegram
604 Pine Avenue
Long Beach, CA 90844

PROOF OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA
County of Los Angeles

I am a citizen of the United States, and a resident of the county aforesaid; I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of The Long Beach Press-Telegram, a newspaper of general circulation printed and published daily in the City of Long Beach, County of Los Angeles, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Los Angeles, State of California, on the date of March 21, 1934, Case Number 370512. The notice, of which the annexed is a true printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit.

May 3, 9, 2007

The Long Beach Press-Telegram, a newspaper of general circulation, is delivered to and available in, but not limited to the following cities: Long Beach, Lakewood, Bellflower, Cerritos, Downey, Norwalk, Artesia, Paramount, Wilmington, Compton, South Gate, Los Alamitos, Seal Beach, Cypress, La Palma, Lynwood, San Pedro, Hawaiian Gardens, Huntington Park, La Mirada, Carson, Santa Fe Springs.

I declare under penalty of perjury that the foregoing is true and correct.

Executed at Long Beach, LA Co. California

this 9 **day of** May - 2007

Proof of Publication of

PUBLIC NOTIFICATION

The City of Long Beach Water Department ("LBWD") prepared and adopted the 2005 Urban Water Management Plan ("Plan") update in accordance with State Water Code Section 10610 through 19656 of the Urban Water Management Planning Act ("Act"). The LBWD has prepared amendments to the Plan also in accordance with these sections of the State Water Code. Copies of the Plan and of draft copies of the LBWD amendments will be available for public inspection and comments from April 30, 2007 to May 17, 2007. The Plan and draft copies of the amendments to the Plan will be available for public inspection at:

Long Beach Water Department
Administration Building
1800 East Wardlow Road
Long Beach, CA 90807

and

the Long Beach Water Department's website:

www.lbwater.org

A public hearing prior to the adoption of the amendments will be held at the Long Beach Water Department Administration Building on May 17, 2007. This hearing will be conducted by the Board of Water Commissioners on May 17, 2007, starting at 9:30 a.m.

Pub. May 3, 9, 2007(2t)
PT(214652/124668)

Long Beach Water Department
The Standard in Water Conservation & Environmental Stewardship

Board of Water Commissioners

KEVIN L. WATTIER, General Manager

May 17, 2007, Board Meeting

Subject:

Authorize adoption of amendments to the Long Beach Water Department 2005 Urban Water Management Plan (UWMP).

Executive Summary:

The State of California requires the Board of Water Commissioners (Commission) to adopt an Urban Water Management Plant (UWMP) once every five years. The Commission adopted UWMPs in 1985, 1990, 1995, 2000 and 2005. By adopting the UWMP the LBWD qualifies to apply for certain State of California funding, once the UWMP has been certified as "complete" by the California Department of Water Resources (DWR).

DWR reviews each plan submitted to the State for completeness. DWR has recently completed its review of the LBWD 2005 URMP and has requested that two references to the Metropolitan Water District of Southern California (MWD) be amended. LBWD staff has drafted amendments accordingly and views these changes as non-substantive in nature. By adopting the amendments requested by the DWR, the latter will certify the Board-adopted 2005 UWMP as complete.

Board Options/Fiscal Impacts

Option #1: Adopt the two (2) amendments to the Long Beach Water Department 2005 UWMP enumerated in Exhibit A of this Board Letter.

Fiscal Impact: Adoption will qualify LBWD to apply for certain funds from the State of California.

Option #2: Postpone adoption of the amendments.

Fiscal Impact: If not adopted, LBWD would be disqualified for certain funding from the State of California.

Staff Recommendation

Option #1.

5-10-07

Matthew P. Lyons — Date
Director of Conservation & Planning

5/11/07

Kevin Wattier — Date
General Manager

APPROVED 5/17/2007
BOARD OF WATER COMMISSIONERS

Attachments

Exhibit A
Of City of Long Beach Board of Water Commissioner's Board Letter
Regarding Adoption of Amendments
To the 2005 Urban Water Management Plan (UWMP),
A Board Letter dated May 17, 2007

The following are the two (2) proposed amendments to the Long Beach Water Department's 2005 Urban Water Management Plan.

First Revision: Delete existing "Table 20" and substitute the Alternative

Existing Table 20, to be deleted:

Table 20 - Wholesaler identified & quantified the existing and planned sources of water available to LBWD - AF/Year
MWDSC's supplies are pooled supplies, that is, a specific amount is no set aside for each of the 26 MWDSC member agencies. Potentially all of MWDSC's supplies are available to LBWD either through direct delivery or indirectly.
The following are the "normal year" supply projections from the MWDSC RUWMP. Please see the LBWD UWMP attachment for MWDSC projections for single and multiply dry-years.

	2010		2015		2020		2025		2030	
Wholesale	Existing	Planned	Existing	Planned	Existing	Planned	Existing	Planned	Existing	Planned
Colorado R	711,000	-	678,000	(35,000)	67,000	(35,000)	677,000	(35,000)	677,000	(35,000)
California A	1,772,000	185,000	1,772,000	185,000	1,772,000	240,000	1,772,000	240,000	1,772,000	240,000
In-Basin St	-	-	-	-	-	-	-	-		

* In-Basin Storage shown as "0" because the storage is for use during dry years, not "normal" years, which is the subject of this table.

Proposed Alternative:

Table 20 - Wholesaler identified & quantified the existing and planned sources of water available to LBWD - AF/Year
Table 20 identifies existing and planned wholesale water supply sources and quantities available to meet the direct use demand in the LBWD service area.

Wholesaler Sources	2005	2010	2015	2020	2025	2030
Colorado River & Calif. Aqueduct	43,939	35,658	30,758	31,912	30,488	29,516

Second Revision: Delete the single paragraph under the heading "Imported Water" in Section 2.4 Reliability of Supplies and substitute the Alternative

Existing Paragraph to be deleted:

The MWD makes several types of water available to its member agencies, including "interruptible" water for replenishment and for agricultural use, and "firm" water for M&I (municipal and industrial) demands. LBWD relies on MWD's firm supplies for approximately ½ of its total water supply, or about 36,000 acre-feet. MWD, in its draft 2005 Regional Urban Water Management Plan, projects that it will meet all requests for firm supplies for the next 25 years, during average water years, and during single-year and, with the possible exception of demands in the year 2030, multiple dry-years (based on 1990-92 hydrology). The MWD can accommodate seasonal and year-to-year fluctuations in precipitation due to the flexibility built into its water supply programs and the storage on and off its major aqueducts. The supply programs include interruptible programs such as replenishment and certain agricultural water supplies. The storage programs include storage along the Colorado River, the California Aqueduct, groundwater banking programs in places such as Arizona and California's Central Valley, MWD's own Diamond Valley Lake, and MWD's conjunctive use programs with its member agencies such as the LBWD. Additionally, the LBWD enjoys preferential rights to an amount of MWD's firm supplies sufficient to meet its need for MWD water.

Proposed Alternative:

In its Draft Regional 2005 Urban Water Management Plan (September, 2005), MWD presents its supply availability at the regional level, rather than at the member agency level. With that, LBWD is not able to quantify the availability of imported supply from MWD specifically for LBWD. However, in that draft plan (Section II.2 - *Evaluating Supply Reliability*), Metropolitan was able to show that it can maintain 100% reliability in meeting direct consumptive demand under the conditions that represent normal, single driest, and multi-dry years through 2030. Inferring from the supply reliability findings stated by MWD, LBWD concludes that MWD is capable of supplying imported water to meet demand projected by LBWD under various hydrologic conditions.

Additionally, the LBWD enjoys preferential rights to an amount of MWD's firm supplies sufficient to meet its need for MWD water.

LONG BEACH WATER DEPARTMENT

Leader in Environmental Stewardship and Water Conservation

2005 Urban Water Management Plan

Long Beach Board of Water Commissioners

Frank Clarke, President
William B. Townsend, Vice-President
Stephen T. Conley, *Member*
Helen Z. Hansen, *Member*

Kevin L. Wattier, General Manager

Matthew P. Lyons, Director, Conservation & Planning

Revised May 17, 2007

Long Beach Water Department
2005 Urban Water Management Plan

Executive Summary

The Long Beach Water Department (LBWD) provides an uninterrupted supply of quality water through economically efficient and environmentally responsible means to the half-million people and the business community of the City of Long Beach, California.

We have fulfilled this tremendous responsibility for the last ninety-four years and fully expect to keep this promise to our community far into the future. This document, the 2005 Urban Water Management Plan (UWMP), articulates how this responsibility will be fulfilled in the years to come.

Sixty-five years ago water demands were met by simply pumping water from the local groundwater basin. Today's water demands are met by means of a very complex and tightly integrated mix of aqueducts hundreds of miles long, water stored in Long Beach, in the greater Long Beach region, throughout the Central Valley of California and even outside of California, by ever expanding uses of reclaimed water for irrigation and industrial purposes, and more innovative and aggressive forms of water conservation.

Future water demands will be met by all these means plus expanded use of reclaimed water and water conservation, conjunctive use and groundwater storage, plus other cost-effective and environmentally responsible means we are actively pursuing. An example being seawater desalination. The focus of the UWMP is on the future, on the next twenty-five years.

The LBWD has met past challenges for reliability, affordability, and environmental stewardship. The new, complex reality which is today's water industry and LBWD's effective response are borne out by a simple comparison: the population of Long Beach has *increased* 25-percent since the mid-1980's, yet LBWD's reliance on imported water has *decreased* by ten-percent. The LBWD met these challenges in several ways.

- Expanded use of reclaimed water: the LBWD has aggressively expanded its reclaimed water distribution system. Most of the larger irrigation users have been converted from potable (imported) water to reclaimed water. The LBWD now serves about 6,000 acre-feet[1] of reclaimed water to its customers each year.
- Aggressive water conservation: the LBWD has maintained aggressive water conservation for the last decade and a half. If per capita water use remained the same as it had in the fourteen years leading up to the drought of the early

[1] An acre-foot of water equals the amount of water needed to cover one acre of land with one foot of water; which equals about 43,560 cubic feet or 325,851 gallons.

1990's, Long Beach would be consuming about 17,000 acre-feet more imported water than it does at the present time.

- Greater reliance on local groundwater supplies: LBWD has annual pumping rights of less than 27,000 acre-feet of water in the 1960's; today it has over 32,000 acre-feet of rights.

Several factors will drive future water demands, including population growth, housing density, employment, and household income. More people means more demand for water. The population of Long Beach is expected to increase fifteen-percent from today's 490,100 to approximately 564,900 by 2030.

Per capita water use in single family housing is higher than in multi-family units, in large part because of the former's greater use of water outdoors. The number of single family units is expected to increase twelve-percent from today's 77,000 to 86,000 by 2030; while multi-family units increase 26-percent from 90,000 to about 113,000 over the same period. The higher rate of growth in multi-family units portends higher density and lower overall per capita water use.

Increased employment indicates greater economic activity, which in turn portends increased demand for water in the commercial, industrial, and institutional sectors. Employment in Long Beach is expected to increase 23-percent from today's 200,000 to 244,000 in 2030.

Water use tends to increase and decrease along with incomes. As incomes increase households tend to consume more water in any number of ways, from purchasing spas to installing more water-intensive landscapes. Incomes in Long Beach are expected to increase very little over the next twenty-five years, from about $37,000 to $40,000 (both numbers are in year 2000 dollars), for an increase of just eight-percent.

These factors are expected to have the following impact on domestic demand for water in Long Beach over the next twenty-five years:

	2005*	2030
Potable Water	69,894 af	72,200 af
Reclaimed Water	5,210 af	14,400 af
Total	75,104 af	86,600 af

**These numbers are estimates.*

This represents a total increase of fifteen-percent, with potable demand increasing just three-percent.

In addition to normal municipal and industrial demands, the LBWD has created an innovative partnership with the Water Replenishment District of Southern California (WRDSC) to annually inject 4,200 acre-feet of highly treated reclaimed water into the seawater barrier in place of the imported drinking water previously utilized. That project is currently in operation, replacing half the annual imported drinking water. By 2015, one hundred percent of the injected water is expected to be reclaimed water.

The LBWD will meet most of these future demands with highly reliable, cost effective, and environmentally responsible groundwater, reclaimed, and conserved water supplies. All three of these sources are environmentally responsible. Because water extractions from the groundwater basin are highly regulated, impermeable layers of clay protect the groundwater from surface contamination, and a mandated fee structure exists to generate revenues required to keep the water table at desirable levels, the groundwater is very reliable. Groundwater is the least expensive source of potable water, costing approximately half that of imported drinking water. Reclaimed water is highly reliable as well, given that neither adverse hydrologic conditions nor other factors such as growth in other parts of southern California significantly affect the availability of reclaimed water to the LBWD. Economically, the operating cost of reclaimed water is very low. And although the capital cost of installing new reclaimed water mains for new customers is very expensive, the LBWD offsets these costs with state and federal funding. The LBWD can expect to conserve more than 21,000 acre-feet of water per year by 2030, an amount equal to 29-percent of the potable demand at that time.

A fourth source of local supply by 2030 could well be desalinated seawater. The LBWD has partnered with the U.S. Bureau of Reclamation and the Los Angeles Department of Water and Power to construct and operate the largest and most significant seawater desalination research facility in the United States. Experts are using this facility to research the economic, technical, and environmental feasibility of what is known as the "Long Beach Method" of seawater desalination, an innovative approach that is anticipated to reduce the amount of energy needed to desalinate seawater by twenty- to thirty-percent. The LBWD will commit to what would be an extremely reliable water supply if it proves to be technically, economically, and environmentally feasible.

The imported drinking water purchased by the LBWD will remain an important supply. The LBWD purchases this water wholesale from the Metropolitan Water District of Southern California (MWD), an agency which is essentially a cooperative of the major water agencies in southern California. Working with its member agencies, the MWD has established itself as a leader in innovative water planning, establishing an array of storage programs throughout southern California, the Central Valley, and along the Colorado River. Through the MWD leadership, southern California has, in turn, become a national leader in urban use of reclaimed water and water conservation. Through its collaborative and exhaustive planning process, the MWD has established a high level of confidence in the long-term reliability of its supplies through a continuation and expansion of the programs such as those mentioned above: reclaimed water, conservation, and water storage programs.

The LBWD provided copies of the draft plan to the City's elected officials as well as the city manager, city advanced planner, city librarian, and city clerk, and solicited their input. The LBWD developed the UWMP in concert with other water agencies including the largest urban water agency in the United States, the MWD, from whom the LBWD purchases half its water wholesale. Eight cities in the greater Long Beach area, as well as the county of Los Angeles, were invited to participate in the development of the UWMP and were provided with draft copies for their review and comments. Finally, several community organizations were also provided with copies of the draft and invited to submit comments.

The LBWD has positioned itself to continue its stellar record of reliability, quality, cost effectiveness, and environmental stewardship well into the first half of the 21st Century.

Introduction

The Urban Water Management Planning Act (Act) requires urban water suppliers to describe and evaluate, every five years, sources of water supply, demand management measures, implementation strategies and schedules, and other relevant information and programs.

In compliance with the Act, the Board of Water Commissioners of the City of Long Beach prepared and adopted Urban Water Management Plans in 1985, 1990, 1995 and 2000, and filed those plans with the California Department of Water Resources, and has now prepared and adopted this document, the Long Beach Water Department's (LBWD) 2005 Urban Water Management Plan ("Plan").

The Act requires a public involvement process in the development of the UWMP. As shown on Table 1, a draft of the Plan was made available for review at the LBWD and distributed to, among others, the Mayor and Members of the City Council, the City Manager, the City Librarian, and the City Clerk. On December 1, 2005, the City of Long Beach Board of Water Commissioners conducted a noticed Public Hearing on the draft to receive public input prior to the adoption of the Plan. Upon closing the Public Hearing, the Board of Water Commissioners adopted the 2005 Plan on December 1, 2005.

This report was developed using the DWR's recommended guidelines.

Long Beach Water Department

The LBWD was established July 1, 1911, by the City Charter to regulate and control the use, sale and distribution of water owned or controlled by the City of Long Beach. On June 27, 1911, the voters approved the issuance of an $850,000.00 bond to purchase the two companies serving the City and on July 1st of that year, the City's Municipal Water Department began operations.

At a special election on February 17, 1931, the voters of Long Beach approved the City's membership in the MWD, establishing Long Beach as one of the original 13 Cities in what is now the largest urban water agency in the U.S., providing about ½ of all potable water consumed in the southern California coastal plain – serving approximately 18 million people from Ventura county in the north to the Mexican boarder in the south.

At the same election in 1931, the voters also approved a City Charter amendment creating the Board of Water Commissioners. The Board is comprised of five member of the Long Beach community, each serving up to two 5-year terms. Members of the commission are nominated by the Mayor and approved by the City Council.

The City Charter entrusts the Board with significant responsibility and authority. The Board is charged with full jurisdiction over all water works necessary to the acquisition, treatment, sale, and distribution of water served to the City and the City's sewer system. Among other duties, the Board has authority to acquire or sell real property, to construct and operate water facilities, to purchase equipment and to make contracts. Additionally, the Board is responsible for establishing the LBWD missions and goals, and adopting policies and strategies to meet these ends.

The Board-adopted mission of the LBWD incorporates the water and sewer systems operations and maintenance, reclaimed water, and embraces customer-centered, efficient, and environmental sensitive operations:

- to deliver an uninterrupted supply of quality water to our customers;
- to effectively dispose of, or reclaim, sewage and runoff waters; and
- to operate in an economically efficient and environmentally responsible manner.

The Board also adopted a set of 'Values' to support the mission:

- a proactive mindset, anticipation of future needs;
- effective communication within the LBWD and the community at large;
- enthusiastic support of water education programs; and
- responsible support of water conservation activities.

Each year the Board adopts a set of specific, actionable Critical Objectives that focus the LBWD activities. The Critical Objectives cover infrastructure, water supply, service areas and offerings, economic and capital resources, human resources, stakeholder/constituency involvement, performance measurement/outcomes, and governance issues.

For more information on the LBWD, please visit our web site at www.lbwater.org; for more information on the City of Long Beach, please visit www.longbeach.gov.

Section 1 – Agency Coordination

The Long Beach Water Department (LBWD) is an urban water supplier as defined by Water Code section 10617, annually providing approximately 75,000 acre-feet, or roughly 24.5 billion gallons, of potable and reclaimed water to roughly 90,000 accounts that serve over 480,000 people. Therefore, LBWD is required to prepare and adopt this Urban Water Management Plan (Plan) by December 31, 2005.

Coordination with Appropriate Agencies (§ 10620 (d))

Table 1 - Coordination with Appropriate Agencies shows the level of coordination between LBWD and other agencies. The LBWD primarily serves the community of Long Beach. As shown in Table 1, small parts of other communities are also served. Those other communities were notified of the development of the UWMP and encouraged to participate and comment.

Approximately 50-percent of the drinking water served by LBWD is purchased wholesale. The wholesale provider is the MWD. As a wholesale agency, the MWD must, and has, prepared a Regional UWMP. This Regional UWMP was developed in very close cooperation with the agencies, such as LBWD, which purchase the wholesale water. The MWD was notified of the development of the Plan and encouraged to participate and comment.

UWMP preparation (§ 10620 (e))

This LBWD Plan was prepared by LBWD staff.

Resource maximization / import minimization plan (§10620 (f))

LBWD uses several water management tools and options to maximize local resources and minimize the need to import water. Approximately ½ of the potable water served by the LBWD is imported by the MWD, the balance being water pumped from the local groundwater basin. Firm imported water is more expensive than extracting and treating local groundwater; therefore, LBWD defaults to local groundwater production, all else being equal. So when LBWD reduces potable-water use through greater use of reclaimed water or conservation, the need for firm imported water is reduce by an equal amount.

- Reclaimed Water: LBWD has aggressively expanded its reclaimed water distribution system. Most of the larger irrigation users have been converted from potable (imported) water to reclaimed water. The LBWD now serves about 6,000 acre-feet of reclaimed water to its customers each year.

- Seawater Intrusion Barrier: LBWD has worked closely with the Water Replenishment District of Southern California (WRDSC) to develop a facility for treating reclaimed water to drinking water standards, and injecting that water into the seawater intrusion barrier in southeastern Long Beach. The project is now complete and in operation. Up until this point in time, water injected into the barrier has been imported drinking water. This project will initially substitute the treated reclaimed water for up to one-half of the imported water; project plans call for replacement of 100-percent of imported drinking water.
- Conjunctive Use: the LBWD, working with the MWD and the WRDSC, has created a new storage program in the groundwater basin. Under this conjunctive use program, water is stored in the groundwater basin during wet years, and extracted during dry years, or when it is called by the MWD. The conjunctive use program reduces demand for imported water during dry years, the most important time for these reductions.
- Conservation: the LBWD has maintained aggressive water conservation for the last decade and a half. If per-capital water use remained the same as it had in the fourteen years leading up the drought of the early 1990's, Long Beach would be consuming about 17,000 acre-feet more imported water than it does at the present time. A description of the LBWD demand management program is included in this UWMP.
- Seawater Desalination: the LBWD has been conducting leading-edge research on seawater desalination, with an eye towards creating a technologically-, environmentally-, and cost-effective alternative to imported drinking water.
- Regional Planning: the LBWD has worked closely with the MWD on the development of the latter's Integrated Resource Plan, integrating regional demand projections and supply planning. This IRP includes regional targets for expanded water conservation and use of recycled water, minimizing the need for imported water.
- Groundwater Management: the local groundwater basin is managed by the WRDSC; the LBWD works closely with the WRDSC to maximize the value of the basin for the public good, maintaining the health of the basin and maximizing its safe yield. The LBWD also participates in groundwater advisory board to the WRDSC, and participates in the association of groundwater agencies. Protecting the health of the groundwater basin and maximizing its safe yield are essential tools for minimizing imported water, particularly during dry-year events.

City and County Notification and Participation (§ 10621(b))

The LBWD was required to notify cities and counties in its service area of the opportunity to submit comments regarding the Plan during the update process. As shown in Table 1, these entities were notified and their comments solicited. Ninety-nine percent of LBWD's accounts are located in City of Long Beach; the balance located in an unincorporated area within the county of Los Angeles and seven other cities.

Supplier will periodically review and adopt any changes or amendments (§ 10621(c))

The LBWD will periodically review and adopt any changes or amendments to the Plan in accordance with the procedure set forth in Water Code sections 10640 through 10645.

Section 2 - Contents of UWMP

2.1 Appropriate level of planning for size of agency

The level of detail provided in this Plan reflects the size and complexity of the LBWD. However, all elements required by the Urban Water Management Planning Act are discussed. Historic information has been included when available.

2.2 Service Area Information with 25-year Projections

Demographics

Table 2 - Population: Current and Projected projects the City's population from 2005 through 2030. This estimate was developed by the Southern California Association of Government (SCAG) and used by the MWD and LBWD in their projection of water demand.

Projecting population twenty-five years into the future is a business ripe with uncertainty. Therefore, a sensitivity analysis was conducted on the projection to assess whether the impact on demand for water would change significantly if these estimates were off by what could be considered maximum realistic amount, namely, that the population grows at twice the rate estimated by SCAG. Because the overall population increase is very small, Long Beach being an older built-out community, the net effect of population grown at twice the rate estimated by SCAG has only the slightest impact on demand for water in Long Beach: doubling the annual population rate used by SCAG only increases the demand for potable and reclaimed water by roughly nine-percent by the year 2020. Given the lack of precise knowledge about the future, and the outcome if the sensitivity analysis, the SCAG estimates appear reasonable and were, therefore, used in the Plan.

Climate and ETo

Weather impacts how much water people use and how much is needed for landscape irrigation. **Table 3A - Average Climate in Long Beach** shows 47 years of weather data for the Long Beach area, providing information on the average maximum and minimum temperatures for each month.

The first chart on Table 3A show that the average annual temperature has increased about one degrees over the last 45 years but that annual average temperatures can fluctuation by as much as about three degrees over a one-year period and up to six degrees over this entire period. This great variation calls into question the statistical significance of the one-degree increase over the same period.

The second chart shows the annual rainfall for this same period. The annual rainfall has averaged about 12 inches per year; but this average appears to mask a slight increase in the average annual rainfall. But, like the temperature increase noted above, this average and this increases are overwhelmed by year-to-year fluctuations. For example, there was a difference of 18 inches of rainfall between 1983 and 1984 (26.7 in vs. 8.5 inches, respectively). The total rainfall can fluctuate from a low of 2.6 inches (2002) to a high of about 38 inches in this past winter (2004-05).

Rainfall in Long Beach impacts demand, but not supply. Demand for water goes down as rainfall increases. LBWD's supply of water comes from the groundwater basin, which is fed, in part, by precipitation in the San Gabriel Mountains but not from rainfall in Long Beach (layers of impermeable clays and silt lay between the surface and the aquifer that water is drawn from). The precipitation in the San Gabriel Mountains does not affect the supply to Long Beach in the short term because the water percolates over many decades from the spreading grounds to where it is extracted in Long Beach. In that sense, what is important are changes in the long-term average rainfall. It is important to note that this precipitation is only one of three sources of water percolated into the groundwater basin; the other two are MWD wet-year replenishment supplies and treated recycled water.

Table 3B - CIMIS Information shows CIMIS evapotranspiration (ETo) information for the Long Beach area for the period between 1991 and 2004. As shown, the average annual ETo during this period is about 45 inches, but, like rainfall, the annual ETo fluctuates quite a bit: from a low of 38.9 inches (2001) to a high of 51.8 inches (1997). ETo is an indication of the amount of water lost through evaporation and plant transpiration. Higher ETo means more water is needed for a particular landscape; lower ETo, less water. The chart on Table 3B shows the annual ETo decreased in the last few years, but it can be assumed this decrease is nothing more than a fluctuation around a mean, just like rainfall and temperature, as noted above. In other words, it is reasonable to assume that, based just on trends in ETo, the amount of water needed for landscape irrigation in Long Beach will not change significantly over time.

Other Factors Influencing Water Demand

The demand projections for Long Beach were first developed by the MWD, using input from LBWD and the Southern California Association of Governments, a regional planning agency. MWD used this data as input into it econometric demand-projection model. The model takes many factors into consideration including expected changes in

population, density, employment and incomes. The LBWD reviewed and concurred with the values input into the econometric model as well as the model's output. The following are major inputs used in the econometric model.

HOUSING: **Table 3C - Other Factors Influencing Water Demand** projects an increase of 32,599 housing units over the 25-year period between 2005 and 2030; this represents an increase of just 0.7-percent per year. This is consistent with the projections of a slow increase in population. Currently about 54-percent of the housing units are multi-family; this percentage is expected to increase slightly because Long Beach is a built-out community with very little open space for new single-family units. Table 3C shows the number of people per household is about 30-percent greater in single family housing, but the density of housing per acre is much greater for multi-family: about 6 units per acre and 27 units, respectively. Therefore, the density of people per acre in multi-family housing is about three times that of single-family housing. The higher concentration of housing units and people per acre necessarily means less water use per capita.

In summary: the rate of new housing created over this period will be very low and most of this new housing will be multi-family units. With the higher density will come lower per capita water use for new residents, lower than would be expected in a community in which most new housing units are single-family.

EMPLOYMENT: Water use will increase as more people work, consuming water on the job for personal use and in the process of performing their duties. Table 3C shows the estimated increase of 44,904 jobs over the 25-year period; from 199,473 jobs to 244,377, in 2005 and 2030, respectively. This represents an increase of just 0.8-percent per year, which is roughly similar to the overall population growth estimates. These low employment-growth estimates point towards slow growth in demand for water within the commercial, industrial, institutional sector (CII).

INCOME: Water use and household incomes tend to rise and fall together. As a household's disposable income increases it will have less financial incentive to conserve water and may have more money to invest in a water-consuming device such as a Jacuzzi or swimming pool. Rising household incomes, then, put upward pressure on the demand for water. Table 3C projects the average household income in Long Beach to increase by just 0.3-percent per year, adjust for inflation. This limited increase will have a negligible impact on the demand for water over the same period.

2.3 Water Sources

Water supply projections are show on **Table 4 - Current and Planned Water Supplies – AF/Y**. The major sources are water purchased wholesale from the MWD,

groundwater pumped and treated by the LBWD, recycled water and, possibly beginning as early as 2010, desalinated seawater.

Groundwater

LBWD has the right to pump 32,684 acre-feet per year of groundwater from the Central Basin and 0.7 acre-feet from the West Coast Basin. LBWD has no wells in the West Coast Basin and, therefore, does not pump those water rights, but does, from time to time, use those rights for the in-lieu replenishment of that basin.

The Central Basin is a groundwater aquifer under 277 square miles in mostly urbanized southern Los Angeles County. The basin was seriously over-drafted by the mid-1900's. The basin was adjudicated in Superior Court in the early 1960's, strictly limiting extractions to apportioned rights, and apportioning the pumping rights to certain parties; the judgment, therefore, provides the framework for groundwater management of this basin. A copy of the judgment, an 91-page document, is enclosed as an attachment and is also available at the LBWD web site:

- www.lbwater.org

or more specifically,

- http://www.lbwater.org/pdf/CentralBasinJdgmnt.pdf

The judgment is monitored by the court-appointed Watermaster, the Department of Water Resources. The Watermaster publishes a comprehensive annual report documenting many aspects of the basin, including the exact location of the basin, the amount of replenishment taking place and replenishment operations, the number of active and inactive wells, water quality information, the sale and lease of water rights, how much water was extracted and by who, the seawater barrier operations, 55 years of data tracking groundwater levels at key monitoring sites, water imported into the Central Basin area for use by local water agencies, a complete history of the Watermaster services and the successful efforts to keep the Central Basin safe yield in tact. A copy of the most current report available at the time of the development of this Plan, the 82-page report for FY 2003-04, is included as an attachment. Copies of this and previous annual reports are available from the watermaster at:

- http://wwwdpla.water.ca.gov/sd/watermaster/central_basin_reports.html

The annual pumping rights allocated in the judgment exceeds the natural yield of the basin. Therefore, in addition to restricting water production, the judgment charges the Water Replenishment District of Southern California (WRDSC) with the replenishment of the basin. Parties extracting water from the basin pay an assessment, to the WRDSC, per acre-foot extracted. This assessment is used by the WRDSC to purchase replenishment water and to fund other programs for the replenishment and protection of the basin. For more information on the WRDSC, go to http://www.wrd.org. The

WRDSC publishes a comprehensive Engineers Survey and Report each year, the 62-page report for 2005 is enclosed as an attachment and can also be found at:

- http://www.wrd.org/documents/2005%20Final_Report_March2.pdf

This report goes into great detail regarding groundwater production, groundwater conditions, the quantity and availability and cost of groundwater replenishment, and groundwater projects and programs.

Table 5 - Groundwater Pumping Rights - AF/ Fiscal Year (July-June) shows the LBWD groundwater pumping rights in the Central and West Coast groundwater basins.

Table 6 - Amount of Groundwater Pumped - AF/ Fiscal Year (July-June) shows the annual production from each groundwater basin for the years 2000 through 2004. The groundwater production was less than the adjudicated rights of 32,684 acre-feet in each of these years. During this period of time, LBWD worked with the MWD and the WRDSC to replenish the groundwater basin through in-lieu means. This was accomplished by the MDWSC selling surplus wet-year water to the LBWD who, in turn, retired its right to pump its full complement of water rights.

The location and monthly production of each well is identified in the annual Watermaster reports referenced above; this report for 2003-04 identifies 41 wells, 31 of which produced water that year. Six years' of monthly production from the wells is available at the Watermaster's web site:

- http://wwwdpla.water.ca.gov/sd/watermaster/monthly_extraction.html

Table 7 - Amount of Groundwater Projected to be Pumped - AF/Year shows the expected production from each basin for the years 2010, 2015, 2020, 2025, and 2030. The expected production equals the expected annual extraction rights. This amount could increase in dry years if the MWD "calls" its water stored in the conjunctive use account or when water shortages required the LBWD to extract additional water from storage, as allowed and constrained by judgment. This amount could also increase if the LBWD were to purchase or lease additional water production rights at a cost-effective price from an owner of water production rights. This amount could decrease in wet when the MWD and the WRDSC both participate in the in-lieu replenishment program, as in the past.

It is not anticipated that production will change as a result of cones of depression, changes in direction and amount of groundwater flow, movement and levels of contaminants, projected average annual recharge, salinity/ TDS levels or for other factors exclusive of the ones noted above. The LBWD has a very long history of successfully operating at this level of production in the Central Basin without developing significant cones of depression or changing the direction and amount of groundwater flow. The portion of the basin used by the LBWD is free of contaminants, in large part because that part of the basin is isolated from surface contamination by several layers

of impermeable clay. Production is not anticipated to change as a result of average annual recharge because the recharge is managed by the WRDSC for the expressed purpose of maintaining a proper level of recharge and the revenue required to fund this recharge operation will be available because the revenue is generated from a tax on the extraction of the groundwater. Production is not anticipated to be impacted by increased salinity because the source of salinity, namely the Pacific Ocean, is prevented from entering the groundwater basin by an artificial seawater barrier created by the WRDSC's barrier injection program.

2.4 Reliability of Supply

Annual precipitation patterns within individual watersheds may vary substantially from one year to the next. Climate-induced shortages are typically based upon known factors such as El Nino, the Pacific Decadal Oscillation, and Jet Stream variations. These factors have a greater impact on the demand for water in Long Beach than on the supply. Please see **Table 8 - Supply Reliability - AF/Year**, **Table 9 - Basis of Water Year Data**, and **Table 10 - Factors Resulting in Inconsistency of Supply**.

The LBWD has three major sources of water: treated water imported by and purchased wholesale from the MWD, groundwater extracted and treated by the LBWD, and tertiary-treated reclaimed water provided by the Los Angeles County Sanitation Districts. The following discusses the reliability of these supplies and their vulnerability to seasonal or climatic shortage. The LBWD is researching the technological, environmental, and financial feasibility of seawater desalination as a source of potable water. If feasible, this source could come into production as early as 2010. If feasible, this would be a very reliable supply of water impervious to fluctuations in weather and climate. This supply would be used in-lieu of MWD imported water.

Imported Water

Metropolitan Supply Reliability: In its Draft Regional 2005 Urban Water Management Plan (September, 2005), MWD presents its supply availability at the regional level, rather than at the member agency level. With that, LBWD is not able to quantify the availability of imported supply from MWD specifically for LBWD. However, in that draft plan (Section II.2 - Evaluating Supply Reliability), MWD was able to show that it can maintain 100% reliability in meeting direct consumptive demand under the conditions that represent normal, single driest, and multi-dry years through 2030. Inferring from the supply reliability findings stated by MWD, LBWD concludes that MWD is capable of supplying imported water to meet demand projected by LBWD under various hydrologic conditions.

Additionally, the LBWD enjoys preferential rights to an amount of MWD's firm supplies sufficient to meet its need for MWD water.

Groundwater

The LBWD groundwater supply is extracted from the Central Basin aquifers. As noted above, extractions from this basin are limited by order of the Superior Court and a mechanism, i.e., the WRDSC, has been in place for the last 40 years to ensure that these limited extractions do not exceed the basin's natural and artificial replenishment. The water stored in the Central and West Coast basin has increased since 1962 by 165,700 acre-feet.

There are several programs to keep the basin replenished, these include the following:

- To the extent possible, San Gabriel River stream flows are used for replenishing the groundwater basin. The quantity of water from this source fluctuates with changes in weather patters.
- The Long Beach Judgment ensures that actual or replacement flows within and below the San Gabriel River, used for replenishment of the Central Basin, continue to meet historic averages or that replacement water is provided. On a long-term basis this flow is required, by the judgment, to meet fixed minimum benchmarks.
- Reclaimed water is mixed with other waters and allowed to percolate into the groundwater basin. Because this is a reclaimed water supply, it is very reliable, even during fluctuations in weather patters, including multiple dry years.
- MWD's imported replenishment water is purchased for replenishment in the years MWD has this water available. This source can only be interrupted on a temporary basis by MWD, for a maximum of just two years, according the MWD Board-adopted Water Surplus and Drought Management Plan.

Because sufficient storage is maintained in the Central Basin, because non-MWD sources are available for replenishment, and because extractions from the Central Basin are restricted, groundwater supplies from the aquifer are very reliable, even during multi-year droughts.

The following table shows the annual mean stream flow of the San Gabriel River near the Central Basin aquifers spreading ground, USGS 11087020 SAN GABRIEL R AB WHITTIER NARROWS DAM CA. This table is shown for informational purposes only, it does not indicate fluctuations in the reliability of groundwater basin for the reasons stated above.

Annual mean streamflow at , USGS 11087020 SAN GABRIEL R AB WHITTIER NARROWS DAM, CA.

Year	Annual mean streamflow, in ft^3/s	Year	Annual mean streamflow, in ft^3/s	Year	Annual mean streamflow, in ft^3/s	Year	Annual mean streamflow, in ft^3/s
1956	64.1	**1973**	175	**1983**	362	**1993**	783
1964	71.3	**1974**	157	**1984**	89.3	**1994**	108
1965	180	**1975**	104	**1985**	64.4	**1995**	307
1966	138	**1976**	66.3	**1986**	124	**1996**	145
1967	65.4	**1977**	39.9	**1987**	121	**1997**	137
1968	45.8	**1978**	630	**1988**	108	**1998**	350
1969	686	**1979**	143	**1989**	122	**1999**	68
1970	96.8	**1980**	537	**1990**	177	**2000**	158
1971	110	**1981**	135	**1991**	133	**2001**	148
1972	50.6	**1982**	127	**1992**	163	**2002**	124

Reclaimed Water

LBWD receives reclaimed water from the Long Beach Reclamation Plant. This plant is not owned nor operated by the City of Long Beach. However, LBWD has rights to the tertiary water produced by the plant. The plant produces about 22,000 acre-feet of reclaimed water annually. The LBWD currently uses about 6,000 acre-feet and expects to ramp up to approximately 18,600 acre-feet by the year 2030. Because the output of the reclamation plant is basically not impacted by weather or climate change, and because the output of the plant exceeds current and expected demand for reclaimed water, this supply is considered very reliable. The LBWD reclaimed water program is discussed in more detail below.

Table 8 shows the supply reliability of the LBWD water resources. The wholesale purchases, groundwater, and recycled water supplies are available at a consistent level of use, for the reasons stated above. Therefore, no plans need be developed to supplement or replace those sources with more reliable alternative sources or water demand management measures. The LBWD is researching the technological, environmental, and economic feasibility of seawater desalination and LBWD continues to pursue new demand management measures for the purpose of reducing demand for imported supplies.

As a back-up supply in addition to the above, the LBWD also has the right, under the Central Basin judgment, to extract groundwater it has stored in the aquifers, up to 20-percent of its water rights (20% of 32,684 af), and to extract in emergencies up to another 20-percent. Also, LBWD will extract, when called to, the 13,000 acre-feet of MWD conjunctive use water stored in the Central Basin aquifers.

Table 9 shows the base water year data. As shown in Table 10, there are no legal, environmental, water quality, or climatic factors posing a meaningful threat to the reliability of the supplies to the LBWD.

2.5 Transfer and Exchange Opportunities

The UWMP Act encourages water agencies to explore how transfers and/or exchanges would improve the reliability, quality, financial health, or other factors of their water supply. The LBWD is not considering transfers and exchange opportunities because its short-term and long-term water supply portfolios are reliable, as explained above, for the next 25 years and the growth in demand for water has remained flat for the last several years and is expected to grow very slowly in the future. Transfers and exchanges are not necessary to improve the quality of groundwater or reclaimed water; if transfers/ exchanges become necessary to improve the quality of imported water, the LBWD will rely on MWD to make that determination and pursuing the transfers/ exchanges.

2.6 Water Use by Customer-type - Past, Current and Future

Showing the past, current and projected water use by sector is an effective way to show growth patterns and may improve the accuracy of demand projections. While projecting future demand by using General Plan land-use zoning designations and projected build out by water use sector may provide accurate demand projections, that type of information is not available from the City of Long Beach.

The LBWD billing and customer information is managed through the City of Long Beach utility billing department, a department which bills and collects customer information for a number of services provided by the City, such as refuse and natural gas services. For data on past and current water use, this Plan provides a level of information limited by that collected and made available by the City's utility billing system. Future water use projections were based on estimates developed in cooperation with the MWD, which used input from the LBWD and the SCAG and fed that information into the MWD econometric model.

Table 12 - Past, Current and Projected M&I Water Deliveries shows estimates of water use and the number of accounts by customer type. Water use in Long Beach is metered, therefore the values in Table 12 related to unmetered accounts are zero. Table 12 shows M&I demand; that is, it includes all demand, such as the use of reclaimed water for landscape irrigation, except for water used for seawater barrier injection.

The total water demand estimates are based on those in Table 4, which are the numbers developed by the MWD econometric model. The total, because it is a product of the very comprehensive and complex econometric model, is the important number. The numbers in Table 12 are rough estimates of how those totals might be allocated among the different customer classes based on the same proportion of water use as in 2003 and 2004.

It is important to note that the total water use in 2005, as shown in Table 12, is less than would be expected during years of normal weather. Because the balance of the table assumes normal years, there is a jump between the estimate for 2005 and that of 2010.

Table 12 demand estimates do not include the water demand of the Alamitos Seawater Barrier, a barrier preventing seawater from intruding into the Central Basin's fresh water aquifers. Historically, the Central Basin Municipal Water District purchased this imported injection water from the MWD. Between 2000 and 2005, the LBWD took responsibility for supplying water to the barrier; therefore, demand on LBWD increased and demand on Central Basin MWD decreased accordingly. The LBWD expects to shift ½ of this potable demand to reclaimed water within the in fiscal year 2006 and shift the remaining potable demand to reclaimed water in subsequent years.

Agricultural Sales

The LBWD has no agricultural accounts.

Sales to other agencies

As shown in **Table 13 - Sales to Other Water Agencies**, there are no water sales to other retail water agencies. As noted, there were and will be water sales to the WRDSC for injection into the seawater barrier. Those sales are shown in Table 14.

Additional Water Uses and Losses – AF/Year

Shown in **Table 14 - Additional Water Uses and Loses - AF/Year** are the sales of barrier water to the WRDSC and an estimate of the system losses. Not show in Table 14 is the work associated with conjunctive use. Over the last few years, the LBWD, working with the MWD and the WRDSC, and with funding from the California Department of Water Resources, created and filled a 13,000 acre-foot conjunctive use storage project in the Central Basin. The water stored belongs to the MWD; it was put into storage though in-lieu means in cooperation with the LBWD. The LBWD will extract the MWD water when, during shortages, the MWD calls the water as a source of firm M&I sales to the LBWD. Because the conjunctive use water was neither sold by the LBWD to the MWD nor a loss of local water, it is not accounted for on Table 14.

Total Water Use – AF/Year

Shown in **Table 15 - Total Water Use** is the total actual and estimated water demands for the LBWD, including M&I, barrier, unaccounted for, and reclaimed water.

2.7 Demand Management Measures

The LBWD is a member of the California Urban Water Conservation Council (CUWCC), with whom which it consistently files annual Best Management Practices reports. The reports document the LBWD demand management measures. A copy of the 2003 and 2004 reports are enclosed in the Attachments.

The LBWD demand management measures include the installation of water conserving devices. California Water Code Section 375 provides the authority for these actions:

> **375**. (a) Notwithstanding any other provision of the law..., any public entity which supplies water at retail or wholesale for the benefit of...persons within the service area or area of jurisdiction of the public entity may, by ordinance or resolution adopted by a majority of the members of the governing body...after holding a public hearing upon notice...and making appropriate findings of necessity...for the adoption of a water conservation program, adopt and enforce a water conservation program to reduce the quantity of water used by ... those persons for the purpose of conserving the water supplies of the public entity.
>
> (b) With regard to water delivered for other than agricultural uses, the ordinance or resolution may...specifically require the installation of water-saving devices which are designed to reduce water consumption. The ordinance or resolution may also encourage water conservation through rate structure design.
>
> (c) For the purposes of this section, "public entity" means a city, whether general law or chartered, county, city and county, special district, agency, authority, any other municipal public corporation or district, or any other political subdivision of the State.

The LBWD has a very aggressive water conservation program that will be carried forward and expanded. Conservation begins when the water is still in the water mains by keeping the whole water distribution system as leak-free as possible. The LBWD has over 900 miles of water mains, keeping them absolutely leak-free at all times is impossible. However, the LBWD has maintained very low "unaccounted for water"[2]

[2] "Unaccounted for water" is the difference between the amount of water put into the distribution system minus the amount leaving the system as measured by water meters and minus other water uses

losses over the years, usually only about one-half of the industry standard. The LBWD maintains this highly effective water-main conservation program through a proactive strategy that includes, among other things, repairing all water mains and water meters and other equipment as soon as leaks are identified, driving the streets looking for evidence of leaks from its largest water mains, and earmarking the replacement of the oldest water mains in its inventory. This water main replacement program has consistently been one of the most expensive capital projects for the LBWD for approximately the last ten years.

Water "purposefully" leaves the water mains through the LBWD water meters. Some communities provide water without metering the use and/or bill all customers the same based on average water use by all customers, as opposed to billing each customer based on that customer's water use. The later system always results in lower water demands. People tend to conserve even more water when they are charged a higher price as their water use increases. The LBWD strongly encourages water conservation when it bills its customers for water use and has a water-conserving increasing rate structure for residential properties.

Single-family and multi-family customers together are responsible for approximately two-thirds of the City's demand for water. Several of the LBWD programs promote conservation in residential settings, and several of these programs are expected to be expanded in the future. The LBWD's financial billing system automatically checks whether a customer's water use has increased significantly from the past, and when a large increase is observed the customer is offered a free home water-use inspection. In another program, the LBWD contacts the residential water customers with the highest water use and offers, again, the free home water-use inspection. The LBWD continues to provide generous rebates to residential customers against the purchase of water-efficient toilets and washing machines.

Because most residential water use appears to be for landscape irrigation, the LBWD provides, at no cost to the customer, very well attended and received classroom instruction on the design, installation, and maintenance of California-friendly landscape. Innovative conservation programs created by the LBWD include the comprehensive landscape audits for those using the most water; audits that conclude with a comprehensive report detailing landscape and irrigation system issues and provide recommendations on repairs, maintenance, and other improvements.

Another innovative program is the LBWD direct installation of weather-based irrigation controllers, a program under which the LBWD identifies landscape accounts, offering free water-use studies and free installation of weather-based irrigation controllers.

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accounted for by such things as water meter inaccuracy (meters record less and less of the water that flows through them as they age), water used by fire fighters during emergencies and when testing hydrants to verify adequate water pressure, and estimates of the water lost when the water mains break.

Finally, the LBWD is in the process of designing and building a demonstration garden that will highlight low water-using landscapes for residential properties, focusing on issues such as design principles, plant material, non-plant material, creating habitats, storm water capture, and other environmentally beneficial topics.

In addition to spreading conservation to residential accounts and dedicated landscape accounts, the LBWD works closely with its commercial, industrial, and institutional customers to help them conserve water. The LBWD has formed a partnership with the Long Beach Chamber of Commerce to more effectively encourage conservation in the business community. The LBWD has encouraged conservation through targeted direct marketing, through rebates for water conserving devices, and has consistently promoted conservation in the business community through advertisements and other promotional means.

The LBWD actively promotes conservation through its work in the classrooms of the Long Beach Unified School District, the Miller Children's Hospital, and the Long Beach Aquarium of the Pacific. The LBWD promotes conservation by supporting community functions and making presentations at local and regional events, including advertising inserts with utility bills, and purchasing advertising space in environmental publications and the newspaper of general local circulation.

The LBWD encourages conservation through its leak-detection program, metered water program, its rate structure, its work with landscape irrigators and homeowners that use large quantities of water, its rebate programs, and water education programs. However, behind these incentives and education programs is the LBWD prohibition against certain uses of water. Adopted by the City of Long Beach Board of Water Commissioners are prohibitions against leaks in private plumbing systems, watering landscape beyond saturation, operating fountain or other water features that do not recirculate the water, allowing the hose run while washing a car, and other prohibitions. These prohibitions are described in the LBWD Water Conservation and Water Supply Shortage Plan, incorporated into this UWMP, and available from the LBWD upon request.

2.8 Evaluation of DDMs Not Implemented

As shown in **Table 16 - Evaluation of Unit Cost of Water related to Demand Management Measures**, the LBWD is implementing the DDMs recommended in the CUWCC BMPs. Therefore, no evaluation of DDMs not implemented is warranted or required.

2.9 Planned Water Supply Projects and Programs

Shown in **Table 17 - Future Water Supply Projects** are the planned water supply projects and programs that may be undertaken by the LBWD, as identified in its water supply and demand assessment. The following describe those projects.

Expanded Reclaimed Water Infrastructure

The LBWD has a very successful reclaimed water program, utilizing the water for irrigation and for two very innovative programs: the use of reclaimed water for subsidence mitigation and for seawater barrier injection.

Although LBWD has access to reclaimed water, it lacks the distribution system needed to bring reclaimed water to all potential users. Expanding the distribution system has been very expensive, and would be cost-prohibitive were it not for funding from the U.S. Bureau of Reclamation, the State of California, and the MWD.

Expanding the reclaimed water system is expensive, in part, because the City of Long Beach is a built-out, older community (Long Beach was incorporated more than 100 years ago). For example, trenching for new pipelines must take into consideration 100 years of previous pipeline installations, including pipelines for sewer systems, potable water systems, oil production, and natural gas distribution. This construction must also consider other factors which can drive up the cost of the project such as soil contamination and previous street construction (some Long Beach streets are made of 18 inches of steel reinforced concrete, for example) and long abandoned and buried railway lines.

Nevertheless, LBWD expects to continue to expand its reclaimed water system in order to make reclaimed water available to additional customers.

The supply of reclaimed water is not affected by single or multi-year droughts. The production of the reclaimed water plant exceeds the current or project use of reclaimed water; so even drought conditions should not impact the LBWD ability to meet demand.

Reclaimed Water Barrier Injection Phase I & II

Imported drinking water has been injected into a seawater barrier in southeast Long Beach for several decades. The barrier prevents the seawater from intruding into the fresh-water aquifers.

The WRDSC, in partnership with the LBWD and with funding, in part, from the U.S. Bureau of Reclamation, has constructed a facility to polish reclaimed water using reverse osmosis and ultraviolet light. The plant will use reclaimed water from the

LBWD, polish the reclaimed water, and inject the polished water into the seawater barrier.

In Phase I of the project, approximately one-half of imported drinking water is being saved each year, by replacing the potable water with the polished reclaimed water. In Phase II of the project, the balance of the imported drinking water will be saved, each year, by replacing the remaining potable water with polished reclaimed water.

Phase I came on-line in October 2005; Phase II is expected to come on-line several years later.

Both Phase I and Phase II production are drought-proof; that is, the production is expected to continue unimpeded even during multiple, consecutive dry-year events.

Seawater Desalination

The LBWD, in partnership with the U.S. Bureau of Reclamation and the Los Angeles Department of Water and Power, is conducting research on the technical, environmental, and financial feasibility of seawater desalination as a source of potable water. The research is expected to conclude in approximately 2007. A decision, based on the research data, whether to proceed with a production facility is expected to be made at that time.

If and when the decision is made to proceed with a production facility, it is anticipated that:

- it would take from two to four year to permit, design, and construct the facility;
- the plant would produce about 10,000 acre-feet of potable water per year;
- the plant would not utilize a power plant's cooling water as its source water;
- the plant would be located in Long Beach;
- 100-percent of the product water would be used within the City; and
- demand for imported drinking water would be reduced by an equal amount.

Production of potable water from a seawater desalination plant would not be impacted by single-year or multi-year droughts.

2.10 Opportunities for Desalinated Water

Shown in **Table 18 - Opportunities for Desalinated Water** are the opportunities for desalinated water. As described above, the LBWD is conducting research to determine the technical, environmental and financial feasibility of seawater desalination in Long Beach. If this research shows that seawater desalination is technologically,

environmentally, and economically feasible in Long Beach, a project will likely go forward.

2.11 Current or Projected Supply Includes Wholesale Water

Shown in **Table 19 - Agency demand projections provided to wholesale suppliers - AF/Year** are the LBWD demand projections on its wholesale water agency, the MWD. This information has been communicated to the MWD; in fact, it was developed in concert with the MWD.

Shown in **Table 20 - Wholesaler identified & quantified the existing and planned sources of water available to LBWD - AF/Year** are the written information provided by the LBWD wholesaler that quantifies water availability to the LBWD for the next twenty-five years. Table 20 assumes normal year hydrology. Please see the Attachments for additional written material from the wholesalers concerning supplies during single and multiple dry-year events.

It is important to note that for the purpose of the RUWMP, the MWD's supplies are pooled supplies, that is, a specific supply is no set aside for each of the 26 MWD member agencies.

The wholesales water agency provided the information required to complete Tables 20 through 22, attached. This includes information on the existing and planned sources of supply, the supply reliability as a percent of normal supply, and factors resulting in inconsistency with the wholesaler's supply.

As shown in **Table 21 - Wholesale supply reliability - % of normal supply**, the MWD is 100-percent reliable under the single and multiple dry-year events. As shown in the attachment related to MWD's supplies, MWD does not expect to be able to supply the same amount of water during different hydrologic cycles. Table 21A shows that firm demand on the MWD is different during single dry-year events and multiple dry-year events (firm demands are non-interruptible demand, which excludes demand for interruptible agriculture water sales and replenishment water sales), and that MWD supply capability changes as well. But in all cases, the MWD has supplies in excess of demands. Table 21A shows that capability of the MWD supplies and that demand is less than supply in both single dry-year as well as multiple dry-year events. Materials in the Attachment show that as one supply become less consistent, the MWD begins drawing water from other sources in its portfolio. For example, in a single dry-year scenario, MWD projects significant decrease in supply availability on the California Aqueduct, but a corresponding increase in the taking of water from storage.

As shown in **Table 22 - Factors resulting in inconsistency of wholesaler's supply**, any legal, environmental, water quality, or climatic factors posing significant risk to the reliability of the MWD supplies are discussed in the MWD's RUWMP.

Section 3 – Determination of DDM Implementation

The LBWD has included copies of its CUWCC 2003 and 2004 Annual Report as an attachment to this UWMP.

Section 4 – Water Shortage Contingency Plan

4.1 Stages of Action

The issue of water shortages for the LBWD revolves around the reliability of the water purchased wholesale from the MWD. The LBWD's water supplies include recycled water, groundwater, and MWD wholesale supplies, and potentially, desalinated seawater.

- Recycled water is very reliable because the production of recycled water will not decrease significantly in drought conditions and because the recycled water plant produces water significantly in excess of demand (that is, even with a slight decrease in production, the plant's production will still significantly exceed demand).
- Groundwater is very reliable because production of groundwater from the Central Basin aquifer, the source of the LBWD groundwater, is not dependent on favorable single-year or multi-year hydrology. Extractions from the groundwater basin are limited as a result of the basin's adjudication; and the capacity of the basin greatly exceeds the annual extraction rights (see the attached documents addressing groundwater management and the adjudication for more detailed information on capacity, storage, and actual extractions and extraction rights).
- Seawater desalination, if developed in Long Beach, will be very reliable because it will not depend on hydrology. Therefore, its production will not be impacted by drought-induced shortages.

The MWD referenced and summarized a well-articulated Water Surplus and Drought Management plan in its Regional Urban Water Management Plan. This WSDM Plan articulates different stages of shortages and different actions based on those stages. However, the 'shortages' envisioned in the plan have more to do with years in which normal imported deliveries are less than demand on MWD; these 'shortages' do not lead to an allocation of water but are mitigated by drawing down stored water, curtailing interruptible deliveries, acquiring additional supplies from, for example, the spot market, and by taking similar types of actions. A shortage that results in allocation of M&I supplies (municipal and industrial) is called an *Extreme Shortage* by the MWD. It is MWD's objective to avoid an Extreme Shortage that leads to the allocation of M&I supplies and the MWD is not anticipating a shortage of this kind for at least the next 25 years.

If MWD enters an Extreme Shortage, it intends to develop an allocation plan at that time, a plan based on its Board-adopted allocation principles. However, state law appears to provide for two phases of supply allocation. The first phase requires the MWD to allocate water based on Preferential Rights; the second, very extreme shortages, allows the MWD Board to allocate water as it deems best. The California Water Code, Section 350, states that the MWD cannot allocate water outside of Preferential Rights except under the most dire conditions:

> **350**. The governing body of a distributor of a public water supply, whether publicly or privately owned and including a mutual water company, may declare a water shortage emergency condition to prevail within the area served by such distributor whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be *satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection. (Emphasis added).*

The above describes the second phase of the extreme water shortage emergency. Section 135, of the Metropolitan Water District Act describe how water will be allocated in the absence of a Section 350 shortage:

> [e]ach member public agency shall have a preferential right to purchase from [MWD] ... a portion of the water served by [MWD] which shall from time to time bear the same ratio to all of the water supply of [MWD] as the total accumulation of amounts paid by such agency to [MWD] on tax assessments and otherwise, excepting purchase of water, toward the capital costs and operating expenses of [MWD's] works shall bear to the total payments received by [MWD] on account of taxes assessments and otherwise, excepting purchase of water, toward such capital cost and operating expense.

Table 23A - Water Supply Shortage and Conditions lists the different stages of a shortage of wholesale supplies, the water supply conditions describing each stage, and the water supply, as a percent of the shortage, represented by each stage. The Stages shown on the table are based in the MWDCS WSDM Plan (Water Surplus & Drought Management Plan). These stages reflect a condition in which demand exceeds current-year core supplies, forcing the MWD to remove water from storage, reduce or eliminate certain non-firm water sales, purchase water from the spot market or exercise purchase options, and call for extraordinary conservation. It is not until Stage 7 that an allocation takes place. As mentioned above, the MWD does not have an allocation plan in place but does have Board-adopted principles for establishing such a plan and commitment to avoid allocation to the extent possible.

Table 23B - Water Supply Shortage and Conditions shows that Long Beach could be expected to suffer an extreme supply shortage, potentially prompting a retail-level

allocation, when LBWD receives just 74-percent of its firm demands on MWD. LBWD could mitigate the initial reduction in MWD firm supplies through extraordinary water conservation and additional groundwater production.

During the shortage in the early 1990's, the City of Long Beach reduced firm demand through extraordinary conservation by nearly 18-percent; Table 23B assumes a reduction of just 10-percent. Additionally, per the provisions in the Central Basin judgment, the LBWD is allowed to exceed its annual allowable pumping allocation by extracting "carryover" water and emergency supplies, each equal to 20-percent of the annual allowable pumping allocation. If these additional rights are exercised over the course of four years, the annual additional groundwater production offsetting a loss of wholesale supplies would be about 3,260 acre-feet.

Table 23C - Water Supply Shortage and Conditions shows retail water supply conditions in Long Beach during several Phases of a shortage at the retail level. The supply conditions and degree of retail shortages in Table 23C are for illustration only. Causes, conditions and their timing during extreme shortages can be unpredictable; therefore, the Board of Water Commissioners reserves the discretion to move from one Phase of a shortage to another as events inform its judgment.

That being said, the actions to be taken by LBWD within each Phase are prescribe in the Board-adopted resolution describing actions to be taken during a water supply shortage. A copy of this resolution is attached.

4.2 Estimate of Minimum Supply for Next Three Years

Shown in **Table 24 - Estimated Minimum Water Supply Over the Next Three Years - AF/Year** is the three-year estimated minimum supply of water, in acre-feet per year. The three sources of water are reclaimed water, ground water, and wholesale purchases. Recycled water is very reliable irrespective of hydrology because supply will exceed feasible uses during this three-year period. There is sufficient storage in the groundwater basin to ensure the normal annual allowable extractions during the next three years irrespective of hydrology, in part because the groundwater basin is not significantly impacted by hydrology over periods of time as short as three years. The wholesale water provider, the MWD, is affected by hydrology, but has reported that it too can provide for all firm demands over this time period, given the MWD's core supplies, stored water, and other water resources and arrangements.

4.3 Catastrophic Supply Interruption Plan

Three possible catastrophes and the actions the LBWD would take to mitigate the impacts they would have on the LBWD customers are shown in **Table 25 - Preparation**

Actions for a Catastrophe. Given the critical nature of the services provided by the LBWD to public health, and recent security considerations, emergency conditions and responses are no longer explored in public forums such as the 2005 UWMP or the actions to be taken by the LBWD to mitigate the impacts of the emergency and catastrophic events. The LBWD has a confidential, comprehensive study of its vulnerabilities, a study developed in cooperation with federal authorities, regional and local first-responders, and other experts, and has completed or is working to complete the necessary measures to mitigate the impacts of catastrophic events. Describing events, describing impacts on the LBWD's ability to successfully perform its services, and the LBWD's responses would be inappropriate. Suffice it to say that in the event that it could not meet 100-percent of the City's demand for water, the LBWD would declare a water emergency and take appropriate actions as outlined in its water conservation and water supply shortage plan.

4.4 Prohibitions, Penalties and Consumption Reduction Methods

The LBWD water conservation and water supply shortage plan, attached, lists the prohibitions against specific water uses both when water supplies are sufficient to meet normal demands, as well as prohibitions when water supplies are less than normal demands. **Table 26 - Mandatory Prohibitions - Examples** summarizes these prohibitions. These include prohibitions against excessive run-off, cleaning paved surfaces with potable water, failure to repair leaks, surface irrigation during restricted hours, and so on.

Table 27 - Consumption Reduction Methods provides a list the consumption reduction methods the LBWD will use to reduce water use in the most restrictive stages with up to a 50-percent reduction. In addition to the restrictions listed in Table 26, the LBWD will increase public education, increase water rates, increase the kinds of prohibitions, and increase the water use charge imposed when in violation of a prohibition. For detailed information please find the attached water conservation and water supply shortage plan.

Penalties are charges for excessive-use are shown in **Table 28 - Penalties and Charges**. These include the following: water-use charges for violation of prohibited uses of water restrictions, these charges increase with every warning and with the severity of the shortage. The LBWD also imposes tiered water rates on residential accounts; the price of the water in the different tiers increase with the severity of the shortage. LBWD also reserves the right to install flow restrictors or terminate water service after repeated violations.

4.5 Analysis of Revenue Impacts of Reduced Sales During Shortages

Tables 29A-B, and Tables 30A-B, show the anticipated impact of a severe water shortage on the LBWD revenues and expenditures. Determining the actual impact prior to the event is very difficult, given the number and unpredictable nature of the variables involved. With that qualifier, however, it is likely that the change in net revenue and the change in net expenses will be roughly equal. Revenues will be supported by expected rate increase while expenses for water will fall as the total cost of water decreases. Furthermore, staff will likely be pulled from high-cost capital projects to work in conservation services, delaying high capital equipment expenditures, while additional expenses will be incurred in the form of extraordinary water conservation actions.

4.6 Draft Ordinance and use Monitoring Procedures

The LBWD water conservation and water supply shortage plan, attached, lists the mandatory prohibitions against specific water use practices during water shortages during the various phases of an emergency. These prohibitions include excessive run-off, cleaning paved surfaces with potable water, failure to repair leaks, surface irrigation during restricted hours, and so on. Please see the attachment for specifics.

Table 31 – Water use Monitoring Mechanisms shows the mechanisms for determining water-demand reductions will be the monitoring of groundwater production and the purchase of wholesale water, both done on a daily basis, using very high quality data collected and stored electronically using systems currently in operation. That is, demand reduction will be monitored by closely tracking the quantity of water put into the distribution system.

Section 5 – Recycled Water Plan

5.1 Coordination

Reclaimed water used in Long Beach is domestic wastewater that has been fully treated by a primary, secondary (biological), and tertiary (filtration) process. The Long Beach Water Reclamation Plant, operated by the Sanitation Districts of Los Angeles County, treats up to 25 million gallons of wastewater each day. This high quality water is suitable for irrigation purposes in accordance with the California Code of Regulations, Title 22, for Disinfected Tertiary Treated Reclaimed Water, meets all State standards for such reuse, and is environmentally safe.

The constraint to putting more of the reclamation plant's output to beneficial municipal and industrial (M&I) use is the high cost of extending the distribution system to new customers. The existing reclaimed water distribution would not have been possible without the generous and significant financial support of the U.S. Bureau of Reclamation, the California Department of Water Resources, and the MWD.

Responsibility for planning for the future use and distribution of reclaimed water in the City of Long Beach falls under the LBWD. Each year, as part of its capital improvement program and budget process, the LBWD develops a capital plan for the reclaimed water. When developing the plan, the LBWD considers the cost of extending different branches of the reclaimed water distribution system, considers input from its partners such as the WRDSC and other local agencies, and ultimately determines which capital projects are feasible to undertake and when.

Table 32 - Participating Agencies identifies the local water, wastewater, groundwater and planning agencies and how each participated in developing a plan for the use of recycled water in the LBWD service area.

5.2 Wastewater Quality, Quantity and Current Uses

Table 33 - Wastewater Collected and Treated - AF/ Yr shows the wastewater influent and effluent from the recycled water plant that generates the recycled water put to beneficial use by the LBWD. This plant's influent is about 10-percent greater than its effluent, the difference being sludge which gets transported to the region's sewer treatment plant. Maximum effluent of the plant is approximately 25 MGD (million gallons per day); but the plant current operates at a daily average of about 19 MGD. Over the next 25 years the plant may reach capacity. The Long Beach plant is not

expected to be enlarged in the future as there is no open space on site in which to expand. All treated water is treated to tertiary standards. This plant services many communities in addition to Long Beach, such as the cities of Lakewood and Cerritos. Only about 10-percent of the plant's influent is from the City of Long Beach. Much of the wastewater collected from Long Beach is treated in Carson; the influent streams of the sanitation districts' plants are interconnected, making it possible to divert influent from one plant to another.

Table 34 - Disposal of Wastewater (non-recycled) - AF/ Yr shows the projections of the amount of reclaimed water generated and discharged from the Long Beach facility into Coyote Creek. These values are the difference between the effluent of the plant and the recycled water put to beneficial use by LBWD.

Table 35A - Recycled Water Uses - Actual AF/ Yr estimates how much of the recycled water will be put to beneficial use in Long Beach in 2005. Normally landscape use is about twice the industrial use; but the record rainfall in the winter of 2004-2005 significantly depressed irrigation usage until it is roughly equal that of industrial use. The primary industrial use at this time is for subsidence mitigation in the oil extraction enterprise in Long Beach.

5.3 Potential and Projected Use, Optimization Plan with Incentives

Table 35B - Recycled Water Uses - Potential AF/ Yr and **Table 36 - Projected Future Use of Recycled Water in Service Area - AF/Yr** basically show the same information because the "potential" future use is what the LBWD expects the actual future use to be.

Table 37 - Recycled Water Uses -- 2000 Projection compared with 2005 actuals - AF/Yr shows that recycled water use in 2005 is not going to meet the expectations estimated in the LBWD 2000 UWMP. The discrepancy has two primary causes: first, the very wet winter of 2004-05 depressed landscape irrigation use; and, second, the use of recycled water for injection into the seawater barrier was postponed due to permitting issues. The permitting issues have been resolved and the plant came on-line October 2005.

Table 38 - Methods to Encourage Recycled Water Use shows the increase in use of recycled water over the next 25 years. This increase results from three major causes: a financial incentive in the formed of recycled water rates being as low as 50-percent of potable water rates; cooperation between the WRDSC and the LBWD in the planning, construction, and operation of the seawater barrier injection plant; and the expansion of the reclaimed water distribution system within the LBWD service area. This table assumes one-half of the increase in use of recycled water, excluding the water to be

used at the seawater barrier, results from the financial incentives and one-half from expansion of the recycled water system.

Section 6 – Water Quality Impacts on Reliability

Water quality is not anticipated to affect water management strategies or supply reliability any more or less than it currently does, for each of the existing sources of water, through the year 2030.

As shown in **Table 39 - Current & Projected Water Supply Changes Due to Water Quality,** water quality of recycled water is not expected to change, the water quality of groundwater is not expected to change, and the water quality of water purchased wholesale is not expected to change.

Section 7 – Water Service Reliability

7.1 Projected Normal Water Year Supply and Demand

Table 40 through Table 42 project and compare normal water-year supply and demand. These tables show that normal demands from 2010 through 2030 can be expected to be met with projected supplies. **Table 41 - Projected Normal Water Year Demand - AF/Yr** shows the increase in demand in subsequent years compared to the year 2005; this increase is large because demand in 2005 was suppressed by the record rainfall; that is, 2005 was not a "normal" year but it is assumed the subsequent years will be.

7.2 Projected Single Dry-year Supply and Demand Comparison

Table 43A - Minimal Impact of Dry-year on Demand graphs both per capita water use and rainfall in Long Beach. The big dip in per capita use came from the water shortage emergency in the early 1990's. Since that time, Long Beach has experienced as much as 25 inches of rain and as little as 2.6 inches, but with little impact on demand. The year in which weather appears to have played a roll in depressing water use, 2005, was not complete at the time of this writing so a comparison between use and rainfall was not possible.

For the purpose of these tables, demand is assumed to be unchanged from "normal" years because not only is there no evidence that demand jumps up during dry years, as noted above, but demand could go down as a result of increased awareness of the need to conserve, particularly during multiple dry-years, as was the case in the early 1990's. For these reasons, for the purpose of this analysis, it is assumed that dry-year demand is the same as normal demand.

Table 43 through Table 45 projects and compares single dry-year supply and demand for the years 2010, 2015, 2020, 2025, and 2030. As shown in Table 8 and Table 17, and in the discussions about these tables, supply is expected to meet demand for water in single dry-year scenarios.

7.3 Projected Multiple Dry-year Supply and Demand Comparison – 2006-2030

Table 46 through Table 60 projects and compares multiple dry-year supply and demand, per year, for the year 2006 through 2030. As mentioned in section 7.2, supply is expected to meet demand even in multiple dry-year events, as shown in Table 8 and Table 17, and in the discussions related to these tables and topics.

For the purpose of these tables, demand is assumed to be unchanged from "normal" years because demand could go down as a result of increased awareness of the need to conserve, but demand could be driven up if the dry conditions extend to the LBWD service area.

Section 8 – Adoption and Implementation of UWMP

A copy of the City of Long Beach Board of Water Commissioners' resolution adopting the LBWD 2005 UWMP is attached.

The LBWD has reviewed the Demand Management Measures (DMM) implementation plan and the recycled water plan contained in its 2000 UWMP. Key within the 2000 DMM plan is the system maintenance capital project expected to replace old cast iron water mains that are most susceptible to breakage; when these lines break a great deal of water is lost. In the last five years over 400,000 linear feet of old cast iron water main has been replaced. As assumed in the 2000 UWMP, the LBWD continued its "High Bill Investigation" program, which uses automated technology to identify unusually high water use amount its 90,000 customers and, when this high use is noted, offers to perform a water-use investigation at no cost to the customer. During this same period of time, the LBWD continued to participate, as projected in the 2000 UWMP, in the conservation rebate programs for residential and CII devices, as noted in the CUWCC reportings, continued its increasing block rate structure for residential customers, and aggressively pursued other projects such as the public education program.

Refer to Section 5 and Table 37 for a discussion on the LBWD progress towards meeting its 2000 UWMP projections of the use of reclaimed water.

Refer to Section 2.7 for a discussion of the CUWCC BMP Annual Reporting. The LBWD had submitted annual reports to the CUWCC and the BMPs are being implemented as planned.

List of Attachments

A. Board of Water Commissioners resolution adopting *2005 UWMP*

B. Tables 1 through 60, referenced in the body of the UWMP.

C. Central Basin Judgment

D. Watermaster's Central Basin Report, FY 2003-04

E. WRDSC's 2005 Engineering Survey and Report

F. LBWD Water Conservation and Water Supply Shortage Plan

G. CUWCC BMP Reports for 2003 and 2004

H. MWD Water Supply Projections

I. Board of Water Commissioners action revising the *2005 UWMP*

J. Proof of public notice of public hearing on the *2005 UWMP* and its May 2007 revisions

Attachment B

Table 1 - Coordination with Appropriate Agencies

Category	Agency	Received Notification of Preparation of UWMP and Encouraged to Participate	Participate in UWMP Develop-ment	Com-mented on Draft	Attended Public Meeting	Contacted for Assist-ance	Received Copy of Draft	Sent notice of intention to adopt
Other water suppliers	Metroplitan Water District of Soutern California	X	X			X	X	X
Water management agencies	Water Replenishement District of Southern California					X	X	X
	California Department of Water Resources, Glendale Office						X	X
	Watermaster, Central Basin Aquifer					X	x	x
Relevant public agencies & officials	Mayor, City of Long Beach						X	X
	City Council, City of Long Beach						X	X
	City Manager, City of Long Beach						X	X
	Advanced Planner, City of Long	X				X	X	X
	City Librarian, City of Long Beach						X	X
	City Clerk, City of Long Beach						X	X

Cities in which LBWD accounts are located	# of Accounts	% of Total						
Bellflower	*2*	*0%*	X					X	X
Compton	*2*	*0%*	X					X	X
County of Los Angeles, Unincorporated	*516*	*1%*	X					X	X
Hawaiian Gardens	*7*	*0%*	X					X	X
Long Beach	*88,847*	*99%*	X					X	X
Lakewood	*11*	*0%*	X					X	X
Los Alamitos	*74*	*0%*	X					X	X
Paramount	*6*	*0%*	X					X	X
Signal Hill	*3*	*0%*	X					X	X
Total:	*89,468*	*100%*							

Other								
	Environment Now						X	X
	Eco-Link						X	X
	Chamber of Commerce, Long Beach						X	X
	Available for review at LBWD						X	X
	Posted on LBWD Website						X	X

Table 2 - Population: Current and Projected

Year	MWDSC 2005 R-UWMP Estimate*	Yearly % Inc
2005	490,100	
2006	493,259	0.64%
2007	496,438	0.64%
2008	499,638	0.64%
2009	502,859	0.64%
2010	506,100	0.64%
2011	509,143	0.60%
2012	512,205	0.60%
2013	515,285	0.60%
2014	518,383	0.60%
2015	521,500	0.60%
2016	524,486	0.57%
2017	527,488	0.57%
2018	530,508	0.57%
2019	533,545	0.57%
2020	536,600	0.57%
2021	539,450	0.53%
2022	542,314	0.53%
2023	545,194	0.53%
2024	548,089	0.53%
2025	551,000	0.53%
2026	553,752	0.50%
2027	556,518	0.50%
2028	559,298	0.50%
2029	562,092	0.50%
2030	564,900	0.50%

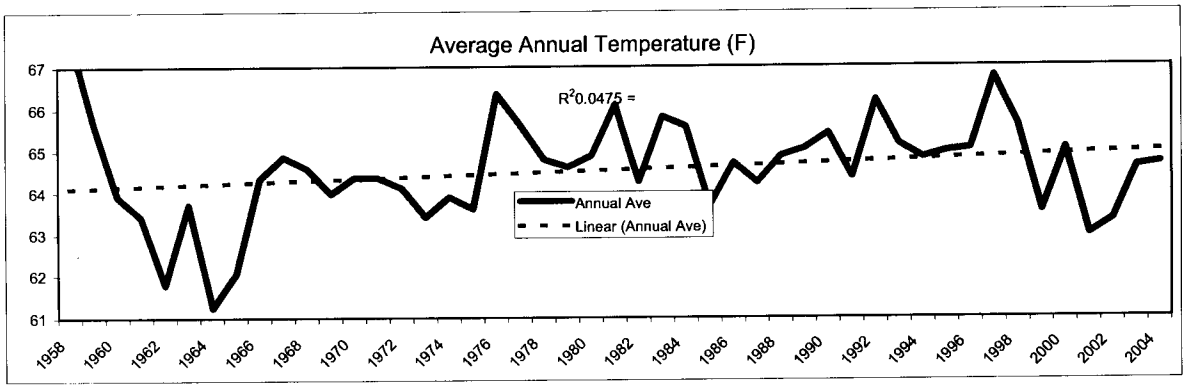
* Projections: SCAG RTP-04.

Table 3A - Average Climate in Long Beach

Period of Record : 4/ 1/1958 to 9/30/2004

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	66.9	67.3	68.4	71.8	73.6	77.1	82.4	84	82.4	78.1	72.2	67.2	74.3
Average Min. Temperature (F)	45.5	47.3	49.7	52.3	56.7	60.2	63.6	64.9	62.9	58	50.4	45.2	54.7
Average Total Precipitation (in.)	2.56	2.87	1.96	0.7	0.2	0.07	0.02	0.07	0.2	0.39	1.3	1.62	11.97
Average Total Snowfall (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

From http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?calong



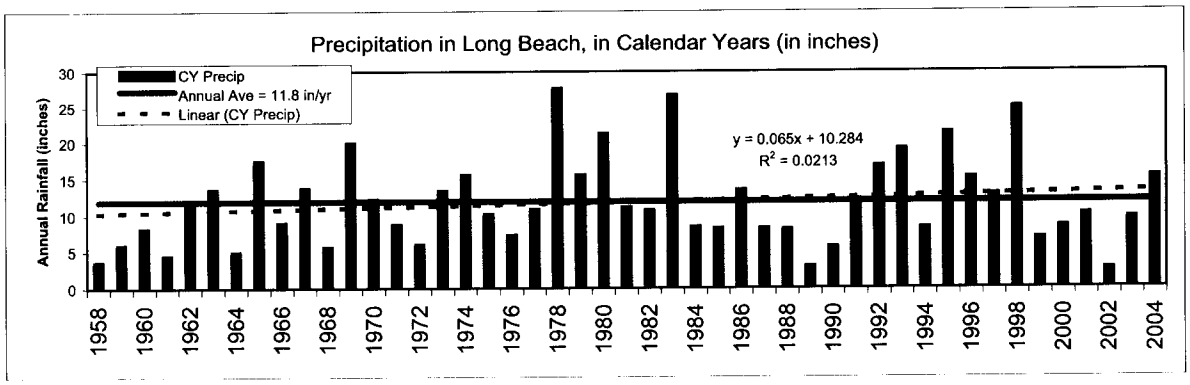


Table 3B - CIMIS ETo Information

ETo = evapotranspiration.

Monthly CIMIS ETo Averages, Long Beach, CA
Period of Record: September 1990 to January 2005

Monthly Average	CIMIS ETo
Jan	1.83
Feb	2.22
Mar	3.55
Apr	4.58
May	5.14
Jun	5.41
Jul	5.78
Aug	5.63
Sep	4.02
Oct	3.11
Nov	2.13
Dec	1.70
Annual	**45.11**

Annual CY Average	CIMIS ETo
1991	44.23
1992	48.30
1993	45.91
1994	42.77
1995	46.16
1996	51.13
1997	51.76
1998	49.16
2001	38.93
2002	40.49
2003	44.62
2004	40.27
Average	**45.31**

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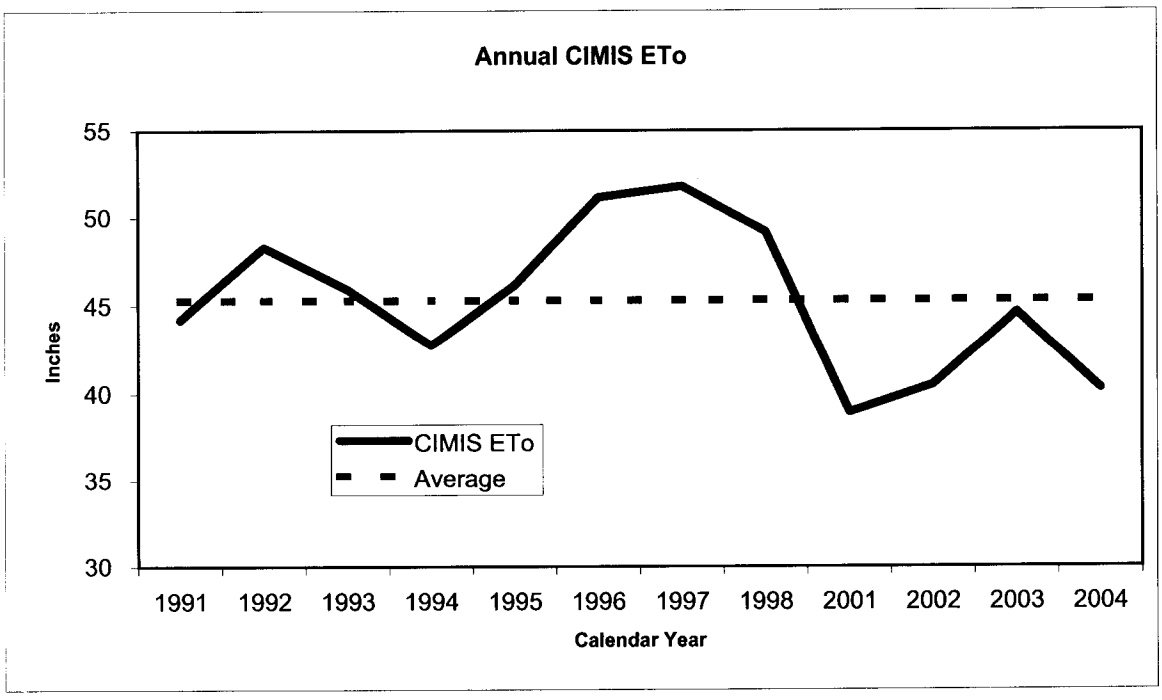
From http://wwwcimis.water.ca.gov/cimis/



* CIMIS system in Long Beach, station #174, is missing data for large parts of CYs 1999 and 2000; therefore, those years were excluded from this analysis.

Table 3C - Other Factors Influencing Water Demand

	2005	2010	2015	2020	2025	2030	Increase	Annual % Inc
Density								
Occupied Housing Units	166,439	172,479	179,100	185,783	192,408	199,038	32,599	0.7%
SF-Units	76,736	78,271	79,384	82,343	85,209	86,322		
MF-Units	89,703	94,208	99,716	103,440	107,199	112,716		
Persons per Household	2.87	2.87	2.85	2.83	2.81	2.78		
Single-Family Household Size	3.28	3.29	3.28	3.26	3.23	3.21		
Multifamily Household Size	2.52	2.52	2.52	2.49	2.47	2.45		
Density - Units per Acre								
SF Housing Density (Units/Acre)	6.2	6.2	6.2	6.2	6.2	6.2		
MF Housing Density (Units/Acre)	27.0	27.0	27.0	27.0	27.0	27.0		
Density - People per Acre								
SF Housing Density (Units/Acre)	20.3	20.4	20.3	20.2	20.0	19.9		
MF Housing Density (Units/Acre)	68.2	68.2	67.9	67.3	66.7	66.2		
							Increase	Annual % Inc
Employment	199,473	212,604	221,287	229,441	237,049	244,377	44,904	0.8%
							Increase	Annual % Inc
Median Household Income (2000 $s)*	$ 37,200	$ 37,742	$ 38,293	$ 38,851	$ 39,417	$ 39,992	$ 2,792	0.3%

* The base values were provided by the MWDSC, some of which came first from the SCAG. The base values were approximately $8,500 greater than those of the 2000 census and were, therefore, scaled back. The City of Long Beach participated in the SCAG estimates but has not generated estimates of its own.

Table 4 - Current and Planned Water Supplies – AF/Y

M&I	2005*	2010	2015	2020	2025	2030
Potable Water						
Wholesale Purchases: MWDSC	43,939	35,658	30,758	31,912	30,488	29,516
Groundwater: LBWD Central Basin Aquifer rights	25,955	32,684	32,684	32,684	32,684	32,684
Supplier surface diversions	-	-	-	-	-	-
Transfers in or out	-	-	-	-	-	-
Exchanges in or out	-	-	-	-	-	-
Seawater Desalination	-	5,000	10,000	10,000	10,000	10,000
Total Potable Water	69,894	73,342	73,442	74,596	73,172	72,200
Recycled water	5,210	6,458	8,058	9,604	12,428	14,400
Total M&I	75,104	79,800	81,500	84,200	85,600	86,600

* Calendar year estimate based on fiscal year actual.

Seawater Barrier						
Potable Water						
Wholesale Purchases: MWDSC	4,672	2,100	2,100	-	-	-
Recycled water	525	2,100	2,100	4,200	4,200	4,200
Total Seawater Barrier	5,197	4,200	4,200	4,200	4,200	4,200
Total M&I and Seawater Barrier	80,301	84,000	85,700	88,400	89,800	90,800

Table 5 - Groundwater Pumping Rights - AF/ Fiscal Year (July-June)

Additional rights may be leased from other "owners" of water rights, from year to year.

Basin Name	Pumping Rights – AF/Year
Central Basin	32,684.0
West Coast Basin	0.7
Total	32,684.7

Table 6 - Amount of Groundwater Pumped - AF/ Fiscal Year (July-June)**

Basin Name	2000	2001*	2002*	2003*	2004*
Central Basin*	24,710	25,342	24,789	27,751	21,173
West Coast Basin	-	-	-	-	-
% of Total Potable Water Supply	34%	35%	34%	39%	29%

* From watermaster reports.

These figures include about 200 af/yr of "micelaneous well" production used for park irrigation.

Table 7 - Amount of Groundwater Projected to be Pumped - AF/Year

Basin Name	2010	2015	2020	2025	2030
Central Basin	32,684	32,684	32,684	32,684	32,684
West Coast Basin	-	-	-	-	-
% of Total Potable Water Supply	45%	45%	44%	45%	45%

Table 8 - Supply Reliability - AF/Year

Using Table 4 data for Year 2010; and looking at M&I demands.

Source	Normal Water Year	Single Dry Water Year	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
Potable					
Wholesale Purchases*	35,658	35,658	35,658	35,658	35,658
Groundwater	32,684	32,684	32,684	32,684	32,684
Supplier surface diversions	-	-	-	-	-
Transfers in or out	-	-	-	-	-
Exchanges in or out	-	-	-	-	-
Seawater Desalination	5,000	5,000	5,000	5,000	5,000
Recycled water	6,458	6,458	6,458	6,458	6,458
Total	79,800	79,800	79,800	79,800	79,800
% of Normal:		100%	100%	100%	100%

** Based on the MWDSC estimate of its supply reliability.*

Table 9 - Basis of Water Year Data

Water Year Type	Base Years
Normal Water Year	average 2000 - 2004
Single Dry Water Year*	1977
Multiple Dry Water Years*	1990-92

** Same as used by MWDSC in its Regional-UWMP.*

Table 10 - Factors Resulting in Inconsistency of Supply

Name of Supply	Legal	Environmental	Water Quality	Climatic
Imported Water	n/a	n/a	n/a	n/a
Groundwater	n/a	n/a	n/a	n/a
Reclaimed Water	n/a	n/a	n/a	n/a
Seawater Desalination**	n/a	n/a	n/a	n/a

*** If developed and put into production, this source is expected to be very consistant.*
If it is not brought into production, the water it accounts for in Table 8 would be replaced by MWDSC supplies.
This transfer of about 5,000 acre-feet to MWDSC will have no impact on the MWDSC ability to supply reliable water to the region, due to the relative miniscual amount of water involved compared to the total MWDSC supply and the supply buffer created by MWDSC.

Table 11 - Transfer and Exchange Opportunities

LBWD does not anticipate participating in transers or exchanges.

Table 12 - Past, Current and Projected M&I Water Deliveries

This includes reclaimed water but excludes water used for seawater barrier injection.

Year		Water Use Sectors	Single Family	Multi Family	Com-mercial	Industrial	Instit /gov	Land-scape	Agric	Total
	Metered	*# of Accounts*	59,155	19,502	6,310	711	1,033	963	-	87,674
2000		***Deliveries - AF/Yr***	**24,268**	**25,351**	**11,595**	**3,428**	**3,898**	**3,118**	-	**71,658**
	Unmetered	*# of Accounts*	0	0	0	0	0	0	0	-
		Deliveries - AF/Yr	**0**	**0**	**0**	**0**	**0**	**0**	**0**	-
	Metered*	*# of Accounts***	60,253	19,864	6,427	724	1,052	981	-	89,301
2005		***Deliveries - AF/Yr***	**25,435**	**26,570**	**12,153**	**3,593**	**4,086**	**3,268**	-	**75,104**
	Unmetered	*# of Accounts*	0	0	0	0	0	0	0	-
		Deliveries - AF/Yr	**0**	**0**	**0**	**0**	**0**	**0**	**0**	-
	Metered*	*# of Accounts^*	61,458	20,862	6,850	772	1,121	1,046	-	92,108
2010		***Deliveries - AF/Yr***	**27,026**	**28,231**	**12,912**	**3,818**	**4,341**	**3,472**	-	**79,800**
	Unmetered	*# of Accounts*	0	0	0	0	0	0	0	-
		Deliveries - AF/Yr	**0**	**0**	**0**	**0**	**0**	**0**	**0**	-
	Metered	*# of Accounts*	62,332	22,081	7,130	803	1,167	1,088	-	94,602
2015		***Deliveries - AF/Yr***	**27,601**	**28,832**	**13,187**	**3,899**	**4,433**	**3,546**	-	**81,500**
	Unmetered	*# of Accounts*	0	0	0	0	0	0	0	-
		Deliveries - AF/Yr	**0**	**0**	**0**	**0**	**0**	**0**	**0**	-
	Metered	*# of Accounts*	64,656	22,906	7,393	833	1,210	1,128	-	98,125
2020		***Deliveries - AF/Yr***	**28,516**	**29,788**	**13,624**	**4,028**	**4,580**	**3,664**	-	**84,200**
	Unmetered	*# of Accounts*	0	0	0	0	0	0	0	-
		Deliveries - AF/Yr	**0**	**0**	**0**	**0**	**0**	**0**	**0**	-
	Metered	*# of Accounts*	66,906	23,738	7,638	860	1,250	1,166	-	101,558
2025		***Deliveries - AF/Yr***	**28,990**	**30,283**	**13,851**	**4,095**	**4,656**	**3,725**	-	**85,600**
	Unmetered	*# of Accounts*	0	0	0	0	0	0	0	-
		Deliveries - AF/Yr	**0**	**0**	**0**	**0**	**0**	**0**	**0**	-
	Metered	*# of Accounts*	67,780	24,960	7,874	887	1,289	1,202	-	103,991
2030		***Deliveries - AF/Yr***	**29,329**	**30,637**	**14,013**	**4,143**	**4,711**	**3,768**	-	**86,600**
	Unmetered	*# of Accounts*	0	0	0	0	0	0	0	-
		Deliveries - AF/Yr	**0**	**0**	**0**	**0**	**0**	**0**	**0**	-

* 2005 water use shows basically no increase over 2000, as a result of the historic rainfall in winter of 04-05. 2010 shows large increase over 2005 only because, again, demand in 2005 was suppressed as a result of very heavy rainfall.

** Based on 2004 estimate.

^ Number of SF and MF accounts estimated based on expected number of units (Table 3C) divided by the current average number of units per accout for SF and MF, respectively. The number of units per account for MF will probably increase with time, but the approach used in this analysis is adequate for these purposes.

Projections of the number of CII accounts use 2005 as a base and increase the number of accounts by the same percent as employment is expected to increase.

Table 13 - Sales to Other Water Agencies

Water Distributed	2000	2005	2010	2015	2020	2025	2030
n/a	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

Table 14 - Additional Water Uses and Loses - AF/Year

Water Use	2000	2005	2010	2015	2020	2025	2030
Saline Barrier	-	5,197	4,200	4,200	4,200	4,200	4,200
Groundwater recharge	-	-	-	-	-	-	-
Conjunctive use*	-	-	-	-	-	-	-
Raw water	-	-	-	-	-	-	-
Recycled	-	-	-	-	-	-	-
Other (define)	-	-	-	-	-	-	-
Unaccounted-for system loss^	4,480	3,100	3,667	3,672	3,730	3,659	3,610
Total	4,480	8,297	7,867	7,872	7,930	7,859	7,810

* See discussion.

^ Estimate for 2005 = potable demand estimate x's UFSL through 3rd Qtr of FY05 = 66,675*4.6% = 3,100
Estimate for 2010 and beyond: assume loss equal to 5% of potable M&I demand.

Table 15 - Total Water Use (sum of Tables 12-14)

Water Use	2000	2005	2010	2015	2020	2025	2030
Total	76,138	83,401	87,667	89,372	92,130	93,459	94,410

Table 16 - Evaluation of Unit Cost of Water related to Demand Management Measures

Non-implemented & not scheduled DMM/ Planned Water Supply Project Name	per Acre-foot Cost ($)
None	na/

Table 17 - Future Water Supply Projects

Project Name	Project Schedule		Normal-year AF to Agency	Single-dry AF/Year to Agency	Multiple-dry Years -- AF/Year to Agency			
	Planning Start Date	Production Start Date			Year 1	Year 2	Year 3	Year 4
Expand Reclaimed Water Infrastructure	On-going	Initial 2010	7,837	7,837	7,837	7,837	7,837	7,837
Reclaimed Water Barrier Injection - Phase I	Complete	2005	2,100	2,100	2,100	2,100	2,100	2,100
Reclaimed Water Barrier Injection - Phase II	Current	2008	2,100	2,100	2,100	2,100	2,100	2,100
Possible Project: Seawater Desalination	Possible 2008	2010	10,000	10,000	10,000	10,000	10,000	10,000
Total			22,037	22,037	22,037	22,037	22,037	22,037

Table 18 - Opportunities for Desalinated Water

Sources of Water	Yield AF/Y	Start Date	Type of use	Other
Ocean Water (see Section 2.9)	10,000	2010	Potable Retail	
Brackish Ocean Water	0	n/a	n/a	n/a
Brackish Groundwater	0	n/a	n/a	n/a
Other (such as impaired groundwater)	0	n/a	n/a	n/a
Other	0	n/a	n/a	n/a

Table 19 - Agency demand projections provided to wholesale suppliers - AF/Year

Wholesalers	2010	2015	2020	2025	2030
MWDSC	35,658	30,758	31,912	30,488	29,516
Total	35,658	30,758	31,912	30,488	29,516

Table 20 - Wholesaler identified & quantified the existing and planned sources of water available to LBWD - AF/Year

Table 20 identifies existing and planned wholesale water supply sources and quantities available to meet the direct use demand in the LBWD service area.

Wholesaler Sources	2005	2010	2015	2020	2025	2030
Colorado River & Calif. Aqueduct	43,939	35,658	30,758	31,912	30,488	29,516

Table 21 - Wholesale supply reliability - % of normal supply

Wholesaler	Single-dry AF/Year to	Multiple-dry Years -- AF/Year to Agency Year 1	Year 2	Year 3	Year 4
MWDSC	100%	100%	100%	100%	100%
Total	100%	100%	100%	100%	100%

Table 21A - MWDSC supply and demand projections under different hydrologies

Single Dry-Year	2010	2015	2020	2025	2030
MWDSC Supply Capability	2,842,000	3,056,300	3,021,400	2,997,800	2,997,800
Demand	(2,326,000)	(2,342,000)	(2,377,000)	(2,504,000)	(2,631,000)
Surplus	516,000	714,300	644,400	493,800	366,800

Multiple Dry-Year	2010	2015	2020	2025	2030
MWDSC Supply Capability	2,618,100	2,833,300	2,810,900	2,797,100	2,797,100
Demand	(2,410,000)	(2,431,000)	(2,459,000)	(2,596,000)	(2,729,000)
Surplus	208,100	402,300	351,900	201,100	68,100

Table 22 - Factors resulting in inconsistency of wholesaler's supply

Name of supply	Legal	Environmental	Water Quality	Climatic
MWDSC	See MWDSC's RUWMP	See MWDSC's RUWMP	See MWDSC's RUWMP	See MWDSC's RUWMP

Table 23A - Water Supply Shortage and Conditions - Wholesale Supply Shortage Prior to Allocation

The following Stages are based in the MWDSC WSDM Plan (Water Surplus & Drought Management Plan). These stages reflect a condition in which demand exceeds current-year core supplies, forcing the MWDSC to remove water from storage, reduce or eliminate certain non-firm water sales, purchase water from the spot market or exercise purchase options, and calls for extraordinary conservation.

The focus of this table is on imported supplies which, although extremely reliable, are the least reliable of the LBWD supplies.

MWDSC Shortage Stage	Water Supply Conditions: When Demand Exceeds Core Supplies for Imports	% Wholesale Shortage
Stage 1	MWDSC takes water from Eastside Reservoir	0%
Stage 2	MWDSC takes water from Semitropic and Arvin-Edison	0%
Stage 3	MWDSC cuts long-term storage and replenishment deliveries to its member agencies	0%
Stage 4	MWDSC takes contractual groundwater supplies and takes water from the Monterey Reservoir	0%
Stage 5	MWDSC Calls for extraordinary conservation and reduces Interim Agricultural Water Program deliveries	0%
Stage 6	MWDSC calls options contracts and buys spot-market water	0%
Stage 7	MWDSC begin allocating water supplies	?

Table 23B - Water Supply Shortage and Conditions
- Cut in Wholesale Supplies Prior to Retail Allocation

This table estimates how deeply imported water supplies would have to be cut before water had to be allocated on the retail level. The allocation could take the form of quantity per customer and/or increase in water rates to decrease demand.

Potable Demand		70,000
- Groundwater Supplies		(32,684)
= Demand subject to Imported Water Shortage		37,316
- Extraordinary Conservation during Extreme Shortages		
Demand Reduction as % of total Potable *	10%	
AF of 'Extraordinary' Conservation		(7,000)
= Demand subject to Imported Water Shortage		30,316
+ Over Production from Groundwater Basin		
Groundwater Rights	32,600	
Over Production re: Carryover	20%	
Over Production re: Emergency Provisions	20%	
Total Over Production	13,040	
Years of Over Production	4	
Over Production per Year		(3,260)
= Demand subject to Imported Water Shortage		27,056
Demand Reduction Prior to Allocation		
Demand for Imports Prior to Actions		37,316
Demand for Imports After Actions		27,056
Difference		10,260
Original Demand		70,000
Demand Reduction Prior to Retail Allocation		15%
Net Demand Prior to Retail Allocation		59,740
Reduction in Imported Supplies Prior to Retail Allocation		27%

Table 23C - Water Supply Shortage and Conditions - Retail Supply Shortage and Conditions

LBWD Shortage Phase	Water Supply Conditions*	Approx. % Retail Shortage*
Potential Supply Shortage	MWDSC Shortage Stages 1 through 4	0%
	MWDSC Shortage Stages 5 though 6 - Extraordinary Conservation	0%
	26% Reduction in Firm, Wholesale Water Supplies	0%
	42% Reduction in Firm, Wholesale Water Supplies	10%
Stage 1 Shortage	58% Reduction in Firm, Wholesale Water Supplies	20%
Stage 2 Shortage	74% Reduction in Firm, Wholesale Water Supplies	30%
Stage 3 Shortage	90% Reduction in Firm, Wholesale Water Supplies	40%
	106% Reduction in Firm, Wholesale Water Supplies**	50%

* These "Water Supply Conditions" and "Approximate % Retail Shortage" are estimates. The LBWD has not adopted specific numeric targets that would trigger a particular Shortage Phase.

** Being "106%" reduction means wholesale water supplies are eliminated plus an amount of local supplies equal to 6% of the firm demand for wholesale supplies.

Table 24 - Estimated Minimum Water Supply Over the Next Three Years - AF/Year

Based on driest historic sequence for the water supply.
The total available significantly exceeds expected demand

Sources of Water	2006	2007	2008	Normal
Recycled Water*	21,000	21,000	21,000	21,000
Groundwater**	32,684	32,684	32,684	32,684
Imported Water***	37,316	37,316	37,316	37,316
Total	91,000	91,000	91,000	91,000

* Demand for reclaimed water is roughly 9,000 af/year, or just a fraction of the available supply.

** This number only includes the annual production rights of the LBWD. Actual extraction rights increase during shortage conditions, meaning actual minimum production LBWD would expect, if seeking the maximum possible under the most extreme conditions over

*** It is difficult to estimate the minimum supply of imported water available to the LBWD because it is a shared water supply allocated to member agencies based on need. The reasonable estimate of the minimum under difficult hydrologic conditions, within the next three years, is the minimum needed to meet firm demand, i.e., an amount roughly equal to firm potable retail demand in Long Beach less estimated groundwater production. MWDSC has projected that it can meet these types of demands under even the most extreme hydrologic conditions for the next three years. Therefore, this assumption is reasonable.

Table 25 - Preparation Actions for a Catastrophe^

Possible Catastrophe	Summary of Action
Regional power outage	Call for extraordinary conservation and take further actions as necessary, including those outlined in the water conservation and water supply shortage plan.
Earthquake - Imported Supply System	Call for extraordinary conservation and take further actions as necessary, including those outlined in the water conservation and supply shortage plan.
	Increase production of groundwater.
Earthquake - Local	Call for extraordinary conservation and take further actions as necessary, including those outlined in the water conservation and supply shortage plan.
	Isolate and repair damaged infrastructure as quickly as possible.
	If necessary, call for mutual aid.
	Depending on conditions, take more or less imported water to meet water demands.

^ Given additional security concerns over the last few years, additional measures could be taken but these measures are not described in public forums such as this UWMP.

Table 26 - Mandatory Prohibitions - Examples

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Failure to repair leaks and breaks in water lines, including irrigation lines.	Permanent prohibition -- that is, these practices are prohibited even when water supplies are adequate to meet normal demands.
Over watering to the point of creating runoff.	
Operating a fountain that does not recirculate the water.	
Washing a car with the hose continuously running.	
Using potable water when recycled water can be cost-effectively substituted.	
Hotels and motels not giving patrons the option of choosing not to have linen and towels laundered.	
Restaurants serving water without first being asked by customers.	Potential water supply shortage condition; supply reduction of possibly 10%.
Operating non-water conserving pre-rinse spray nozzle.	
Washing hardscape.	
Irrigating landscape except on certain days, during certain hours, and for specified lengths of time.	
Irrigating landscape more than two days per week during the 7 'winter' months.	Stage 1 water supply shortage; implemented in supply reduction of perhaps 20%.
Filling residential swimming pools	
Irrigating landscape more than 2 days per week during the 5 'summer' months	Stage 2 water supply shortage; implemented in supply reduction of possibly 30%.
Additional restrictions as deemed necessary by the Board of Water Commissioners.	
Additional restrictions as deemed necessary by the Board of Water Commissioners.	Stage 3 water supply shortage; during supply reduction of possibly 40% to 50%

Table 27 - Consumption Reduction Methods

Please see Table 26 for most of the reduction methods.

Consumption Reduction Method	Stage When Method Takes Effect	Projected Reduction (%)
Increase public education, increase water rates, increase types of water-use restrictions and increase charge for violation of water-use restriction	Stage 1.	20%
Increase public education, increase water rates, increase types of water-use restrictions and increase charge for violation of water-use restriction	Stage 2.	30%
Increase public education, increase water rates, increase types of water-use restrictions and increase charge for violation of water-use restriction	Stage 3.	40% to 50%

Table 28 - Penalties and Charges

Penalty or Charge	Stage when Penalty Takes Effect
$50 with 3rd notice of violation of water-use prohibition; $100 for 4th notice; $200 for 5th notice, etc.	Non-shortage condition and "Potential" water supply shortage condition
$100 with 3rd notice of violation of water-use prohibition; $200 for 4th notice; $400 for 5th notice, etc.	Stage 1
$150 with 3rd notice of violation of water-use prohibition; $300 for 4th notice; $600 for 5th notice, etc.	Stage 2
$200 with 3rd notice of violation of water-use prohibition; $400 for 4th notice; $800 for 5th notice, etc.	Stage 3
LBWD has the option of installing a flow restrictor and the option of terminating water service when necessary to impose water-use restrictions and prohibitions.	At all times.
Tiered water rates for residential accounts.	At all times.

Table 29A - Water-shortage Actions and Conditions that Impact Revenues

Type	Anticipated Revenue Reduction
Reduced sales.	Revenue from the sale of water, depending on account type, is about 65- to 75-percent of total revenue. A reduction in sales of from 0- to 50-percent would mean a reduction in revenue of from 0- to about 35-percent if there were no rate increase during the emergency.

Table 29B - Proposed Measures to Overcome Revenue Impacts

Name of Measure	Summary of Effects
Reduce cost of wholesale water purchases.	In the extreme shortage when the demand for water is cut by 50-percent, essentially all costs associated with wholesale purchases would be eliminated. These purchases represent about 1/4th of the LBWD budget. Therefore, in an extreme shortage, expenditures for the purchase of wholesale water could essentially be eliminated.
Water rate increase.	In a severe shortage a rate increase will be implemented to encourage water conservation. The combination of slighter higher rates and a dramatic reduction in costs, would compensate for the lost sales.
Temporarily curtail capital projects.	Many of the capital projects financed by the LBWD are the sort that must be done within the long-term (say 5 to 10 years), but not necessarily undertaken in any one particular year. In the event of a funding shortfall resulting from an extreme shortage, the LBWD would have the option of cutting expenses by postponing certain capital projects and re-directing staff to emergency conservation efforts.
Use of reserves.	As a prudent agency providing an essential public service, the LBWD maintains a minimum fund balance for use in emergencies. In the unlikely event the LBWD is hurt financially by an extreme shortage, these reserves could be utilized.

Table 30A - Water-shortage Actions and Conditions that Impact Expenditures

Category	Anticipated Cost
Increase staff cost	Minor increase, if any. Staff could be redirected from their normal duties to the emergency work that needs be done. After the emergency, the staff will be refocused on their "normal" capital project duties.
Increase O&M Cost	There could be a reduction in expenses for 'normal' O&M activities if staff performing those functions are redirected to conservation; those savings could be off-set by increased conservation-related project such as the distribution of certain water conserving devices.
Increased cost of supply & treatment	The cost of wholesale water, on a per acre-foot basis, could be expected to increase, but not dramatically, this is the same water that the LBWD would be acquiring less of during the most likely shortages. The cost of pumping and treating groundwater would not change significantly, if at all.

Table 30B - Proposed Measures to overcome Expenditure Impacts

Name of Measure	Summary of Effects
n/a	With the reduction in sales comes a significant reduction in the cost of water and a compensating increase in the water rate to encourage additional conservation. Additionally, because staff will likely be pulled, temporarily at least, from high-capital-cost activities such as capital improvement projects, staffing cost wil not increase but capital equipment costs will decreases. For these reasons, the effect of a shortage on expenditures will be minimal.

Table 31 - Water Use Monitoring Mechanisms

Mechanisms for determining actual reductions	Type and quality of data expected
Groundwater Treatment Plant production.	Production records to be made on daily basis and tracked as necessary. The quality of the data from these records is very high; the data is collected and stored electronically, utilizing systems currently in operation.
Purchase of water wholesale.	Meters tracking wholesale water into the system to be read on daily basis. The quality of the data from these records is very high; the data is collected and stored electronically, utilizing systems currently in operation.

Table 32 - Participating Agencies in Recycled Water Programs

Participating Agencies	Role in Plan Development
Water Agencies	MWDSC: provider of significant financial support.
Wastewater Agencies	Sanitation Districts of Los Angeles County – Long Beach Water Reclamation Plant: treats the waste water to Title 22 standards.
Groundwater Agencies	Water Replenishment District of Southern California: conceptualize and partnered with LBWD in the development of a reverse osmosis and Ultra Violet light treatment plant that transforms the reclaimed water to a level that allows it to be injected into the groundwater basin for the purpose of creating a seawater intrusion barrier.
Planning Agencies	City of Long Beach Community Development Department: looking for opportunities to use reclaimed water in new developments when practical.
Other	U.S. Bureau of Reclamation: provider of significant financial support.
	City of Long Beach Parks, Recreation & Marine Department: looking for new opportunities to use reclaimed water in new developments or to replacement potable water in existing uses, when practical.
	California Department of Water Resources: provider of significant financial support.

Table 33 - Wastewater Collected and Treated - AF/ Yr

Maximum plant effluent capacity: 25 mgd; plant expansion not expected.
Plant is able to convert approximately 89.8% of influent into recycled water; the balance (sludge) transported to water treatment plant.

	2000	2005	2010	2015	2020	2025	2030
Wastewater Influent	23,466	23,393	24,953	26,512	28,072	29,631	31,191
Wastewater Effluent	21,068	21,003	22,403	23,803	25,203	26,603	28,004
Quantity that meets recycled water standard	21,068	21,003	22,403	23,803	25,203	26,603	28,004

Table 34 - Disposal of Wastewater (non-recycled) - AF/ Yr

Treated wastewater that is not recycled is discharged into the Coyote Creek.

Method of Disposal	Treatment Level	2005	2010	2015	2020	2025	2030
Discharge	Title 22	15,793	13,845	13,645	11,399	9,975	9,404

Table 35A - Recycled Water Uses - Actual AF/ Yr

These numbers are for FY ending Sept '05; the months of Aug & Sept are estimates.

Type of User	Treatment Level	2005 AF/Yr*
Agriculture	Title 22	-
Landscape	Title 22	2,585
Wildlife Habitat	Title 22	-
Wetlands	Title 22	-
Industrial	Title 22	2,100
Groundwater Recharge	Title 22	-
Seawater Barrier	Title 22 and advanced treatment using RO and UV.	525
Total		5,210

Table 35B - Recycled Water Uses - Potential AF/ Yr

Type of User	Treatment Level	2010	2015	2020	2025	2030
Agriculture	Title 22	-	-	-	-	-
Landscape	Title 22	2,585	4,463	4,463	4,684	5,228
Wildlife Habitat	Title 22	-	-	-	-	-
Wetlands	Title 22	-	-	-	-	-
Industrial	Title 22	2,100	1,995	3,595	4,920	7,200
Groundwater Recharge	Title 23	-	-	-	-	-
Seawater Barrier Injection	Title 22 and advanced treatment using RO and UV.	525	2,100	2,100	4,200	4,200
Other (type of use)	Title 22	-	-	-	-	-
Total		5,210	8,558	10,158	13,804	16,628

Table 36 - Projected Future Use of Recycled Water in Service Area - AF/Yr

Type of User		2005	2010	2015	2020	2025	2030
Agriculture		-					
Landscape		2,585	4,463	4,463	4,684	5,228	6,300
Wildlife Habitat		-					
Wetlands		-					
Industrial		2,100	1,995	3,595	4,920	7,200	8,100
Groundwater Recharge		-					
Seawater Barrier Injection		525	2,100	2,100	4,200	4,200	4,200
Other (type of use)		-					
Total		5,210	8,558	10,158	13,804	16,628	18,600

Table 37 - Recycled Water Uses -- 2000 Projection compared with 2005 actuals - AF/Yr

Type of User		2000 Projection for FY 2005	FY 2005 Actual Use (est. as of Sept '05)
Agriculture		-	-
Landscape		4,510	2,585
Wildlife Habitat		-	-
Wetlands		-	-
Industrial		6,138	2,100
Groundwater Recharge		-	-
Seawater Barrier		-	525
Total		10,648	5,210

Table 38 - Methods to Encourage Recycled Water Use

Action	AF of use projected to result from this action				
	2010	2015	2020	2025	2030
Financial incentives	624	1,424	2,197	3,609	4,595
Cooperation in development & operation of seawater barrier project	2,100	2,100	4,200	4,200	4,200
Expansion of reclaimed water infrastructure	624	1,424	2,197	3,609	4,595
Total	3,348	4,948	8,594	11,418	13,390

Table 39 - Current & Projected Water Supply Changes Due To Water Quality - percentage

Water Source	2005	2010	2015	2020	2025	2030
Recycled water	0%	0%	0%	0%	0%	0%
Groundwater	0%	0%	0%	0%	0%	0%
Water purchased wholesale	0%	0%	0%	0%	0%	0%
Total	0%	0%	0%	0%	0%	0%

Table 40 - Projected Normal Water Year Supply - AF/Yr

	2010	2015	2020	2025	2030
Supply Total	84,000	85,700	88,400	89,800	90,800
% of Normal Year*	100%	100%	100%	100%	100%

* from Table 4, Projected Supplies during normal hydrology.

Table 41 - Projected Normal Water Year Demand - AF/Yr

	2010	2015	2020	2025	2030
Demand Total (Table 4 & 12)	84,000	85,700	88,400	89,800	90,800
% of Year 2005**	105%	107%	110%	112%	113%

** The percent increase over 2005 is high because record rainfall in 2005 suppressed demand. That is, 2005 was not a "normal year" but this table assumes 2010, 2015, 2020, 2025, and 2030 will be.

Table 42 - Projected Normal Year Supply and Demand Comparison - AF/Y

	2010	2015	2020	2025	2030
Supply Total	84,000	85,700	88,400	89,800	90,800
Demand Total	84,000	85,700	88,400	89,800	90,800
Difference (Supply - Demand)	-	-	-	-	-
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Table 43 - Projected Single Dry-year Water Supply - AF/Yr

	2010	2015	2020	2025	2030
Supply Total	84,000	85,700	88,400	89,800	90,800
% of Normal Year Demand	100%	100%	100%	100%	100%

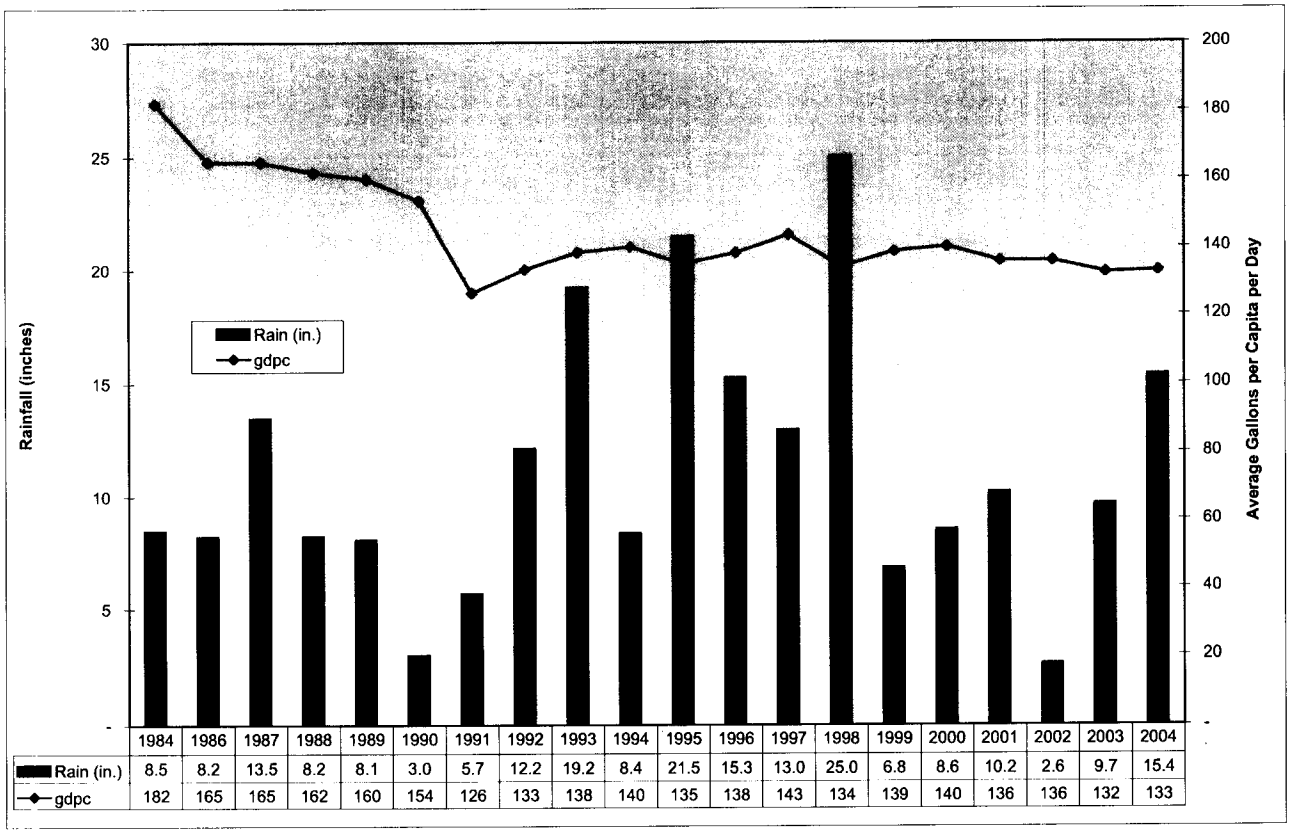
Table 44 - Projected Single Dry-year Water Demand - AF/Yr

	2010	2015	2020	2025	2030
Demand Total	84,000	85,700	88,400	89,800	90,800
% of Normal Year Demand	100%	100%	100%	100%	100%

Table 45 - Projected Single Dry-year Water Supply and Demand Comparison - AF/Yr

	2010	2015	2020	2025	2030
Supply Total	84,000	85,700	88,400	89,800	90,800
Demand Total	84,000	85,700	88,400	89,800	90,800
Difference (Supply - Demand)	-	-	-	-	-
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Table 43A - Minimal Impact of Dry-year on Demand



	1984	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Rain (in.)	8.5	8.2	13.5	8.2	8.1	3.0	5.7	12.2	19.2	8.4	21.5	15.3	13.0	25.0	6.8	8.6	10.2	2.6	9.7	15.4
gdpc	182	165	165	162	160	154	126	133	138	140	135	138	143	134	139	140	136	136	132	133

Table 46: Projected Supply During Multiple Dry-year Period Ending in 2010 - AF/Yr

	2006	2007	2008	2009	2010
Supply Total	81,041	81,781	82,521	83,260	84,000
% of Normal Year	100%	100%	100%	100%	100%

Table 47: Projected Demand Multiple Dry-year Period Ending in 2010 - AF/Yr

	2006	2007	2008	2009	2010
Demand Total	81,041	81,781	82,521	83,260	84,000
% of Normal Year	100%	100%	100%	100%	100%

Table 48: Projected Supply & Demand Comparison During Multiple Dry-year Period Ending in 2010 - AF/Yr

	2006	2007	2008	2009	2010
Supply Total	81,041	81,781	82,521	83,260	84,000
Demand Total	81,041	81,781	82,521	83,260	84,000
Difference (Supply - Demand)	-	-	-	-	-
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Table 49: Projected Supply During Multiple Dry-year Period Ending in 2015 - AF/Yr

	2011	2012	2013	2014	2015
Supply Total	84,340	84,680	85,020	85,360	85,700
% of Normal Year	100%	100%	100%	100%	100%

Table 50: Projected Demand Multiple Dry-year Period Ending in 2015 - AF/Yr

	2011	2012	2013	2014	2015
Demand Total	84,340	84,680	85,020	85,360	85,700
% of Normal Year	100%	100%	100%	100%	100%

Table 51: Projected Supply & Demand Comparison During Multiple Dry-year Period Ending in 2015 - AF/Yr

	2011	2012	2013	2014	2015
Supply Total	84,340	84,680	85,020	85,360	85,700
Demand Total	84,340	84,680	85,020	85,360	85,700
Difference (Supply - Demand)	-	-	-	-	-
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Table 52 - Projected Supply During Multiple Dry-year Period Ending in 2020 - AF/Yr

	2016	2017	2018	2019	2020
Supply Total	86,240	86,780	87,320	87,860	88,400
% of Normal Year*	100%	100%	100%	100%	100%

* For projected normal use Table 40.

Table 53 - Projected Demand Multiple Dry-year Period Ending in 2020 - AF/Yr

	2016	2017	2018	2019	2020
Demand Total	86,240	86,780	87,320	87,860	88,400
% of Normal Year*	100%	100%	100%	100%	100%

* For projected normal use Table 41.

Table 54 - Projected Supply & Demand Comparison During Multiple Dry-year Period Ending in 2020 - AF/Yr

	2016	2017	2018	2019	2020
Supply Total	86,240	86,780	87,320	87,860	88,400
Demand Total	86,240	86,780	87,320	87,860	88,400
Difference (Supply - Demand)	-	-	-	-	-
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Table 55 - Projected Supply During Multiple Dry-year Period Ending in 2025 - AF/Yr

	2021	2022	2023	2024	2025
Supply Total	88,680	88,960	89,240	89,520	89,800
% of Normal Year*	100%	100%	100%	100%	100%

* For projected normal use Table 40.

Table 56 - Projected Demand Multiple Dry-year Period Ending in 2025 - AF/Yr

	2021	2022	2023	2024	2025
Demand Total	88,680	88,960	89,240	89,520	89,800
% of Normal Year*	100%	100%	100%	100%	100%

* For projected normal use Table 41.

Table 57 - Projected Supply & Demand Comparison During Multiple Dry-year Period Ending in 2025 - AF/Yr

	2021	2022	2023	2024	2025
Supply Total	88,680	88,960	89,240	89,520	89,800
Demand Total	88,680	88,960	89,240	89,520	89,800
Difference (Supply - Demand)	-	-	-	-	-
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Table 58 - Projected Supply During Multiple Dry-year Period Ending in 2030 - AF/Yr

	2026	2027	2028	2029	2030
Supply Total	90,000	90,200	90,400	90,600	90,800
% of Normal Year*	100%	100%	100%	100%	100%

* For projected normal use Table 40.

Table 59 - Projected Demand Multiple Dry-year Period Ending in 2030 - AF/Yr

	2026	2027	2028	2029	2030
Demand Total	90,000	90,200	90,400	90,600	90,800
% of Normal Year*	100%	100%	100%	100%	100%

* For projected normal use Table 41.

Table 60 - Projected Supply & Demand Comparison During Multiple Dry-year Period Ending in 2030 - AF/Yr

	2026	2027	2028	2029	2030
Supply Total	90,000	90,200	90,400	90,600	90,800
Demand Total	90,000	90,200	90,400	90,600	90,800
Difference (Supply - Demand)	-	-	-	-	-
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%